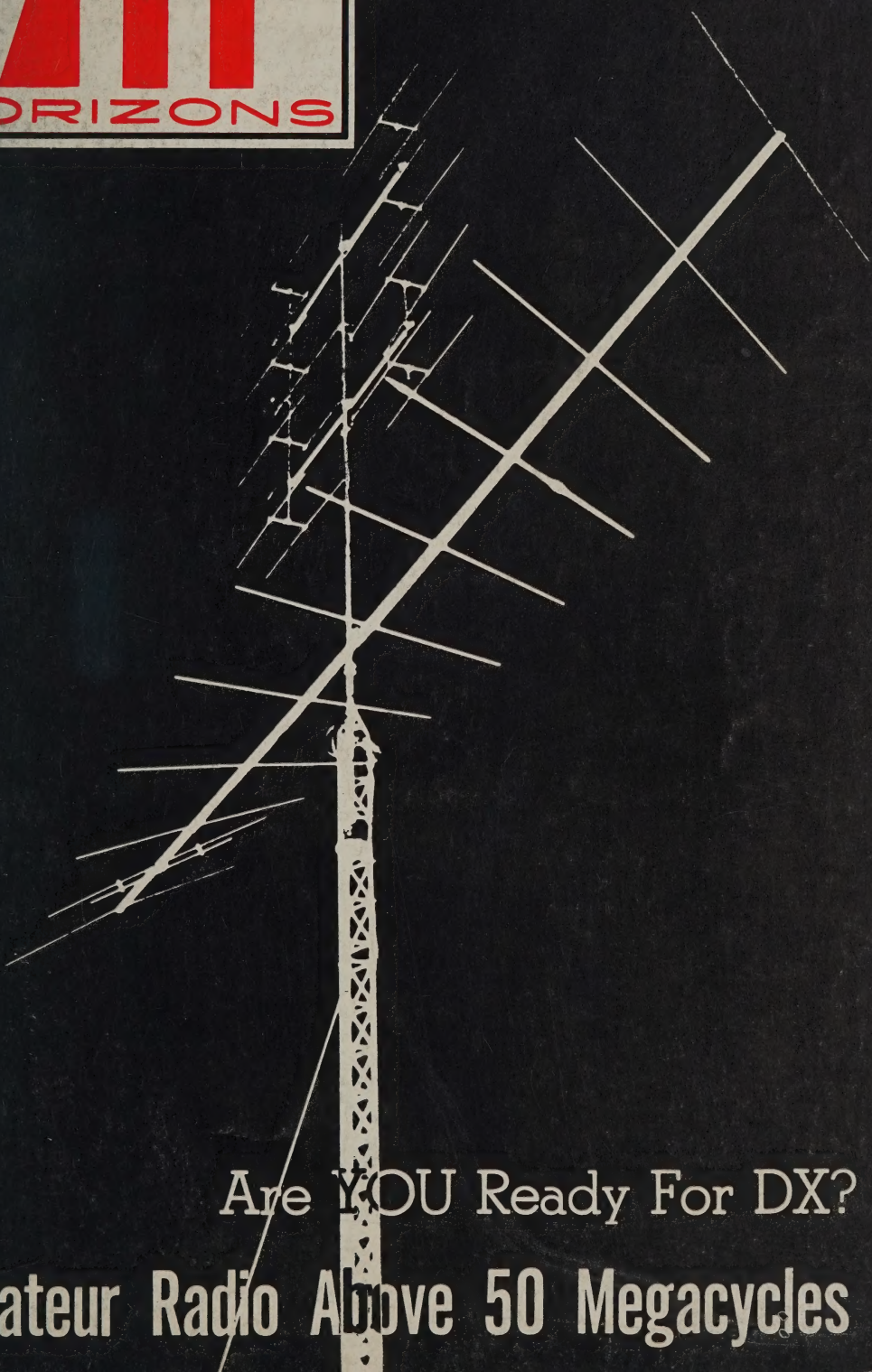
VHF HORIZONS

APRIL 1963
40 Cents



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TRANSCEIVER FOR 6 METERS.

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Now you can run a mobile "power house" using the new Clegg Model 418 transistorized 12V DC power supply / modulator unit to power your THOR 6 transceiver.

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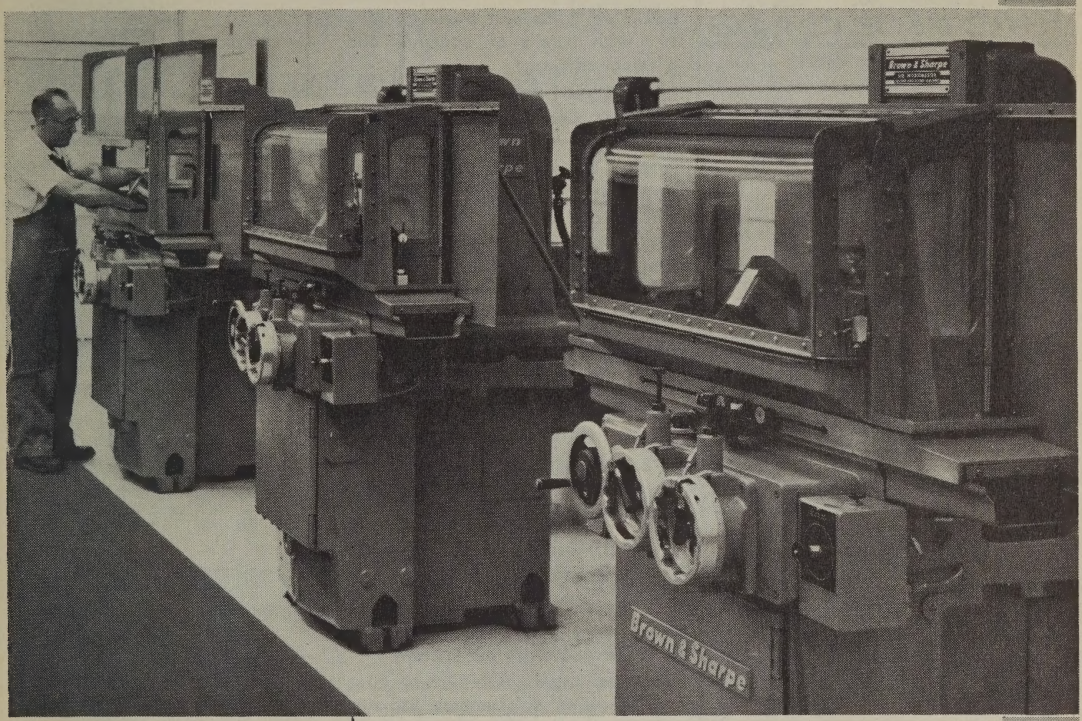
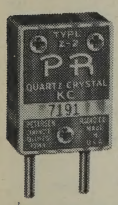


AMATEUR TYPES



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VHF HORIZONS

VOLUME 2 — NUMBER 4
APRIL, 1963

CONTENTS

Features

Departments

VHF HORIZONS (title registered U.S. Post Office) entered as Third Class postage material in Oklahoma City, Oklahoma.

AT BURGHARDT'S ITS *Clegg* FOR TOP VHF PERFORMANCE IN '63

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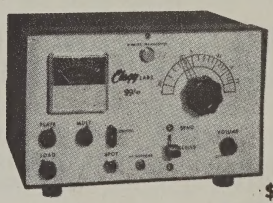
- The sensational new THOR 6, described here.
- And in April — the **all new** VENUS 6 SSB transceiver — watch for the ads.

The unbeatable little 99'er, still champ in the bantam weight transceiver class for mobile or fixed operation.



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For AC Operation

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73, Stan Burghardt, WØBJV

(Look for me on 6 & 2 meters)

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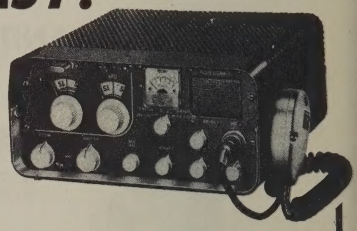

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SCATTER

. . . de K5JKX

ABOUT BOATS AND THEIR ROCKING . . .

'Way back when, I was a newspaper reporter. Five long years I spent grinding out the wrappers for tomorrow's garbage . . . But that's not the point of today's essay.

Thanks to Hollywood and TV, most people tend to have the idea that a reporter is a sort of knight in shining armor, always looking for a crusade and usually finding it. They think he works for a fellow with no hair and a green eyeshade, who picks up a phone and yells "Stop the presses!" at least five times a day.

To be honest, I had a little of this idea too when I first got into the business. I went looking for good crusades—and there are always plenty to be found.

But when I brought them back to the boss, he would always answer with one phrase. It's burned bitterly on my brain. "Don't," he would say with a fatherly-advising expression, "rock the boat."

So maybe it's only natural that when I finally became an editor myself, I should want to rock the boat good and hard at least once. I'm not sorry I did, either, on the subject of class-consciousness among us hams—because it's a subject which has rankled in my heart even longer than the injunction against boat-rocking.

But this particular boat has been shaken long enough for now; my proof for this is the stack of letters which has been building up for some time.

Because he puts it all into easily understood words, I'm turning the rest of this column this month over to R. G. Knowles, W8JND, an IBM engineer in Gahanna, Ohio. This is the last word you'll see in these columns for a spell on this subject—unless the boat needs rocking again.

And while you read OM Knowles' letter, keep this Biblical injunction in mind: "He that hath ears to hear, let him hear."

Dear VHF Horizons,

A number of years ago, a local hub-bub arose, when a small group of hams moved from ten meters to two meters. Our reason for this move was two-fold: first, to provide more reliable communications for a local Civil Defense effort and secondly, to explore a relatively new band.

The original ten meter group, (78 active members in all, of which over 30 were mobiles!) was organized primarily as a Civil Defense effort, so when eight or ten of us went to two meters, a large and immediate "class distinction" movement took over, and some nasty thoughts and words were carelessly flung between both groups.

Finally Civil Defense activities collapsed on both bands! First one, then the other, gave in to petty segregation to the extent that it annihilated, in time, all local Civil Defense activities carried on by amateurs.

Then, as now, I tried to make myself heard above the din of childish name-calling, but succeeded only in distributing the brashness of an over-eager sixteen-year-old with an ax to grind.

Today, nine years later, I see approximately the same type of rift appearing in the ranks of amateurs on a national scale. Having seen this sordid segregation on a local level, and what it did to a few dozen darn good friends, I am now equipped with the experience needed to know that today, on a national level, both sides of this General vs. Technician feud are at fault (in varying degrees) as were both sides of this 10/2 thing here in my home-town.

I am not yelling my fool head off today, as I did nearly ten years ago. I am trying to point out several very important facts however: that we are Hams, first and foremost, Technicians and Generals alike. We have in the past years been responsible for large amounts of "State of the Art" advancement. Now, on the very threshold of the most recent, and perhaps the most important of all modes of communication: VHF/UHF and above, petty grievances and jealousies are at best, slowing progress.

In my ham shack, framed and hanging on the wall, is the following:

(Turn to page 40)

More Mobile Relay

Our proposal to authorize "mobile relay stations" in the amateur service and to establish regulations to govern them seems to have ignited localized but intense interest—both for and against the idea!

The situation seems to boil down to this—those amateurs who have successfully negotiated the present somewhat rocky path to legal repeater operation tend to feel that existing regulations are satisfactory. However, hams who are still battling the red tape tend to support our ideas.

Several of those who have written us to comment have important points to make; most of this report will be devoted to their comments. For a start, since discussion with him started the whole idea, let's turn the floor over to Don Bybee, W6NAS:

"I think this proposal will limit too much amateur repeater operation. It really isn't too much different from the existing rules. We need changes in the rules to permit repeater operation with no announcement of call signs from the repeater but using saying 'thru W6—' by the mobiles sufficient. Then, no logs necessary except for keeping track of when the actual repeater is turned on and ready to be used. We have to make any rule changes **simple** and **flexible.**"

Don also found fault with some specific wording, which he feared might be used to eliminate use of the repeaters by fixed stations. Other wording, he felt might be read to eliminate cross-band operation.

Sharing Don's fears about the wording "MOBILE" relay station was Frank Greene, K5IQL, well-known New Mexico VHF op.

"We did not feel any need for revision or clarification," Frank wrote (he holds WA5DMQ, a mountain-top repeater on Capitan Peak, N.M.).

"The first question arises, why do you call them **mobile** relay stations? In the West, the vantage position of a mountain-top repeater makes possible communication between fixed stations over otherwise impossible paths. The fact that a mobile station, or any station that can hit the frequency, is likewise extended is only a secondary factor. However, our rules of operation dictate that stations in QSO shall 'drag their feet' for mobiles."

Still in the West, Northe Osbrink, WA6-ZEM, wrote to mention a problem with the K6RTU Los Angeles repeater: "I feel that it provides a very important service," Northe wrote. "However, there is one fact that I find rather irritating and inconvenient about its operation. When the repeater is on, it repeats signals from 50.55 Mc to about 51.1 Mc. The operation is not scheduled, and it may go on at any hour. When it is on, it makes use of the 50.55 frequency (the national calling and distress frequency on 6 meters) for its original purpose nearly impossible. The situation could easily be remedied by changing the frequency of operation, and it would then leave 50.55 clear for emergency."

One group agreeing with us that present rules were in need of clarification was the Northwest Amateur Radio Communications System, Inc., a Washington State society. Secretary Barbara Ashley, W7GJL, wrote that the group "has been interested in repeaters for several years and are currently engaged in getting one in operation to cover the Western Washington State area.

"As the current rules and regulations are most ambiguous," Barbara continued, "we heartily support your petition for rule changes concerning Amateur Radio Relay Stations."

Also in agreement with our effort was Robert E. Raper, W4DXC, 6-meter FM liason station for Virginia. Bob wrote, "I want to offer any help I can in the crusade to amend the FCC rules and regulations to allow such operation."

He enclosed a block diagram (Figure 1) of the layout of his legal repeater/remote-control base. "This system has been licensed and in operation since May 4, 1961, under Section 12.64," Bob wrote. "To be completely legal is quite a task, as mentioned in

gives full break-in by the controlling station for identification or information.

"It also goes without saying that the controlling station can shut down the repeater at any time, if unauthorized use or abuse of the operating rules dictates.

"The conventional rig must be modified to some extent. A 3-stage coaxial filter and a Nuvistor pre-amp are installed at the receiver input. A modified squelch relay keys the transmitter. Audio in the transmitter incorporates compression and limiting to prevent loud stations overmodulating.

"At the control point, we have a crystal-controlled monitor receiver, with squelch-operated (vox-operated) recorder for logging. Also, there is a transmitter on the repeater frequency for normal use of the translator. A tape loop connected to the 220-Mc transmitter provides hi-speed MCW for identification, much like the "beep" on the telephone circuits.

"Users are instructed to use their calls in a normal way, and to add the time of day at beginning and end of a QSO.

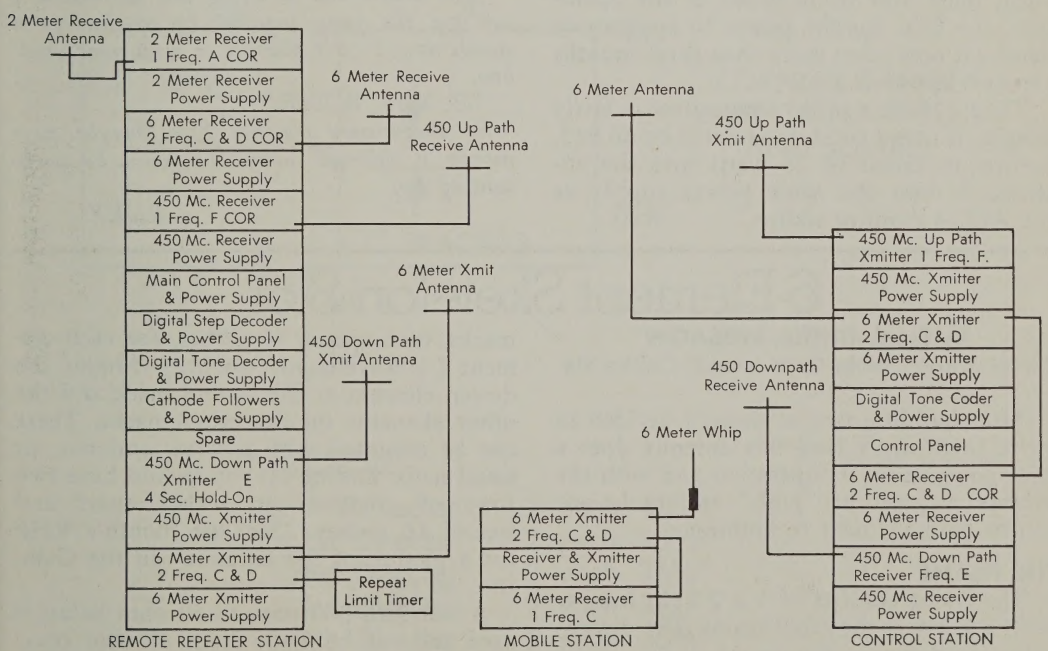
"Our choices of frequencies for the translator were 145.020 Mc for receiving and your article. This system here in Richmond gets very little use by other stations as a mobile repeater; your changes would sure ease the situation."

What does one of these stations encompass? The block diagram of W4DXC's remote-control arrangement shows one approach; Frank Greene's letter describes another in detail:

"The repeater (translator) station consists of a transmitter which is keyed by a receiver. For obvious reasons, the two frequencies are widely separated.

"The simplest rig—such as we started with—is a straight AM repeater, using a modified SCR-522.

"AC power is turned on remotely (in a manner which must be okayed by FCC) by a channel in the 220 Mc band. Full use of a tone generator and decoder permits further flexibility such as switching crystals, etc. Receiver also has a carrier-operated relay. The 220-Mc transmitter at the control point has conventional audio, in addition to the tone generator. Thus the control station can take over the audio of the two-meter transmitter without any carrier heterodyne. This



REPEATER STATION block diagram shows complexity of one legal repeater unit. This is the equipment in use at W4DXC, Richmond, Va., to relay 6-meter signals. Control frequencies are in the 420-Mc band.

146.980 for transmitting. This, of course, makes it possible for Novices and Techs to use it. We know of one unit which uses frequencies outside the Novice band, reportedly finding the operational problems much less acute. However, we feel that our rules will not be abused by those in this area.

"As far as the FCC is concerned, their rules covering the use of one's station by another licensed ham are valid in this case. If you wish to let another ham use your station, so long as the frequency and power are authorized in his own license, you may do so. However, the responsibility of keeping such operation within legal limits is yours.

"Getting back to the technical side, the ultimate—which we hope to have before long—is the linear translator. It will repeat anything it hears: AM, FM, PM, SSB, and whatnot. No detection takes place anywhere, excepting as a side issue for AGC purposes. The incoming signal is converted down to a lower frequency for selectivity and then heterodyned back up to the outgoing frequency.

"Since a complete diagram of the station, showing means used to control the translator, must now be included in the operation, the FCC has the power to approve or deny. (It now takes more than three months for such approval.)

"The 220-Mc control transmitter is fairly simple. It uses a 6252, modulated by an 815. Squirts in excess of 20 watts into the antenna. It uses the same power supply as the ARC-4 monitor station."

So that's the situation until now. No action has been taken on our petition so far as we know. Repeaters **are** legal now, but are somewhat difficult to get going.

"This is a field where we shall never see a large number of such installations," wrote Frank Greene, and we must agree with him. "The installation of good equipment is expensive, and requires no little technical know-how."

But such installations can and have put in good service, extending communications range for both mobile and fixed stations. We still feel they should be more widely known, and more easily licensed. We welcome any additional opinions.

THE ARIZONA REPEATER

We promised, last month, that this month's cover feature would be a complete description of the Pinal Repeater covering southern Arizona on two meters.

But just at presstime, we received the following communique from Turk Smith, W7FRR, who was writing the article for us:

"Hold the phone.

"Half the gang here have the flu, and the one guy who can do the block diagrams has been put on night work at Motorola.

"The article will be along just as soon as I can get the gang together for it—but as it stands now, I can't promise to meet your deadline.

"73, Turk, W7FRR."

So that's why it's not here; maybe next month, if we're all lucky. It's gonna be worth waiting for!

—K5JKX

6-Element Skeleton Slot

by Frank Griffin, WB6AOW
Silverstrand, Santa Cruz Island, California

After building two of these, I decided to write them up. I find this antenna does a very good job in its operation and with the average amount of "junk" and tools one can be built for next to nothing.

THE FRAME

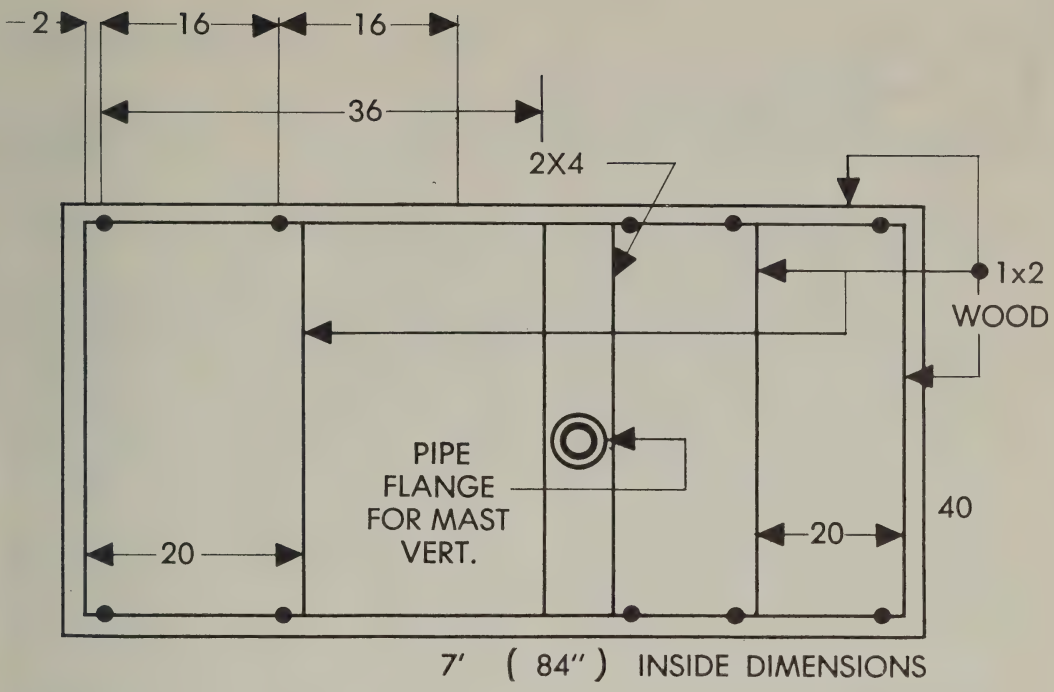
The frame consists of 1 x 2 light lumber with a 2 x 4 as the cross boom. The dimensions are shown in Figure 1.

ELEMENT SPACING

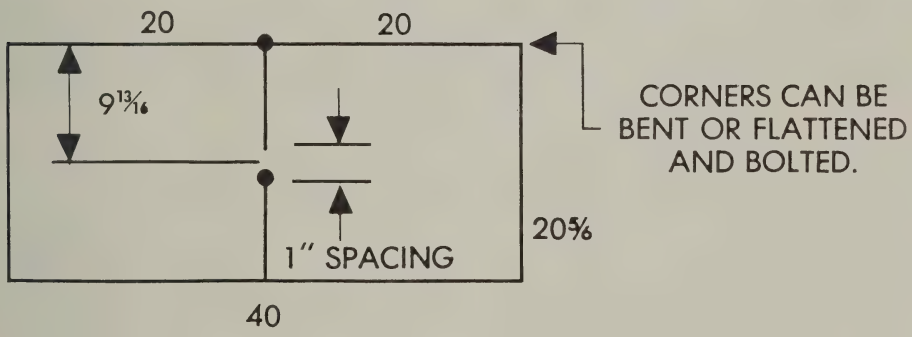
Starting from the end closest to the 2 x 4 (it's offset for balance) measure in 2 inches and make a mark. Then make 5 marks, each spaced 16 inches, for each element (.2 wavelength spacing). Mount the driven element at the second mark and the other elements on the other marks. These can be mounted with a screw and nut, or small nails. Ending up you should have two rows of elements 40 inches apart and spaced 16 inches. (See last month's VHF for a picture of the antenna—in the Gain, Inc., ad.)

A standard 300 ohm to 50 ohm balun is used and can be made from 50 ohm coax. A length of 27½ inches was used.

The second contact with this antenna produced San Diego on a "Twoer," with a S-9 report. So improve that signal and start hearing and getting out.



THE DRIVEN ELEMENT:



The elements:

Reflector	2 each	40"
1st Director	2 each	36½"
2nd Director	2 each	36¼"
3rd Director	2 each	36"
4th Director	2 each	35¾"

All elements made from Conical TV antenna or similar stock

CONSTRUCTION OF SLOT antenna is shown in these views. Mounting technique indicated is for use in vertically polarized areas; rotate 90 degrees for horizontal polarization.

E-Skip on 2 Second Verse

"The opportunity to work stations on 144 megacycles over distances of 800 to 1400 miles is exciting to all two-meter operators, DX fans or not!"

Those words, from the opening paragraph of our January feature concerning "E-Skip on Two," have proved to be our understatement of the year. If our mailbag is any indication, two-meter ops the nation over are going to be looking for skip openings this summer like never before.

And along with all the expressed interest in possible schedules, a batch of additional data has poured in—data which proves that it has happened before, and which offers some new ideas about finding the skip when it's in.

What about this thing called skip? First, let's make it completely clear that we are talking only about E-layer ionospheric skip, such as that known as "Sporadic-E" on 50 Mc. Let's see what the old standby, the ARRL handbook, has to say about the frequency limit for Sporadic-E:

"The upper limit of frequency for sporadic-E skip is not positively known," reads the 1962 edition, "but scattered instances of 144-Mc propagation over distances in excess of 1,000 miles indicate that E-layer reflection, possibly aided by tropospheric effects, may be responsible."

If you've ever worked skip on Six, you know what it sounds like. Starting with a quiet band, you find (usually but not always) a sudden buildup of antenna noise, and then almost instantly there are DX stations all over the band. As the session opens, and as it goes out, signal levels fluctuate rapidly. When the signal is there, it usually pegs your S-meter, but it is also subject to rapid fades on the order of 60 db or more which may chop it into a garbled mess.

The session usually ends as suddenly as it starts. Often you will find in the middle of a QSO the fellow on the other end just isn't there any more!

Keeping this in mind, let's take a look at an excerpt from the log of W8KAY, Art Paradis, of Akron, Ohio. Two-meter ops the country over know Art as one of the true experimenters and top operators on the band. Here's the data he sent:

"Time, **1805.** Routine check of 50 Mc conditions. Noted usual sigs from Texas-Oklahoma area, also a few Louisiana sigs; some working Indiana stations, others working W1, W2, W3. Heard one W1. Sigs from W5 very strong, E layer must be pretty dense. No short skip signals heard to West or Southwest. Fired up with a CQ tape on 144.300, calling 2 of 3 minutes at a time with short listening periods.

"**1837.** W5LUU 144.171, calling me, A3, S9 plus with some QSB. Shifted from A1 here to phase modulation. Signed after solid 8-minute contact. No other sigs heard. Back to the CQ tape.

"**1900.** Contacted W5VWU, Albuquerque, N.M., on landline. His 144 gear not in operating condition but said he would alert K5TQP.

"**1930.** Still hearing W5LUU. Running CQ tape here.

"**1940.** Raised W5BEB, Hamilton, Texas, 144.126 SSB. Shifted to phase modulation here. Did not hear him again. His sigs S9 plus.

"**1958.** Strong A3 on 144.058 . . . 'W5-M--'. Back to CQ tape here.

"**2012.** Raised W5MJD 144.043, Amarillo. S9 plus, almost no QSB. Appears he was sig heard on .058 at 1958. Said he alerted W5SFW. Did not hear Phil on 144, tho heard him earlier on 50 Mc.

"**2135.** WØIC's XYL on landline, says Claude hearing and working Es stations.

"**2149.** KØAYK, 144.090, A3, peaking S8 with bad QSB, calling K9IUF. AYK running 10 watts. No other Colorado stations heard.

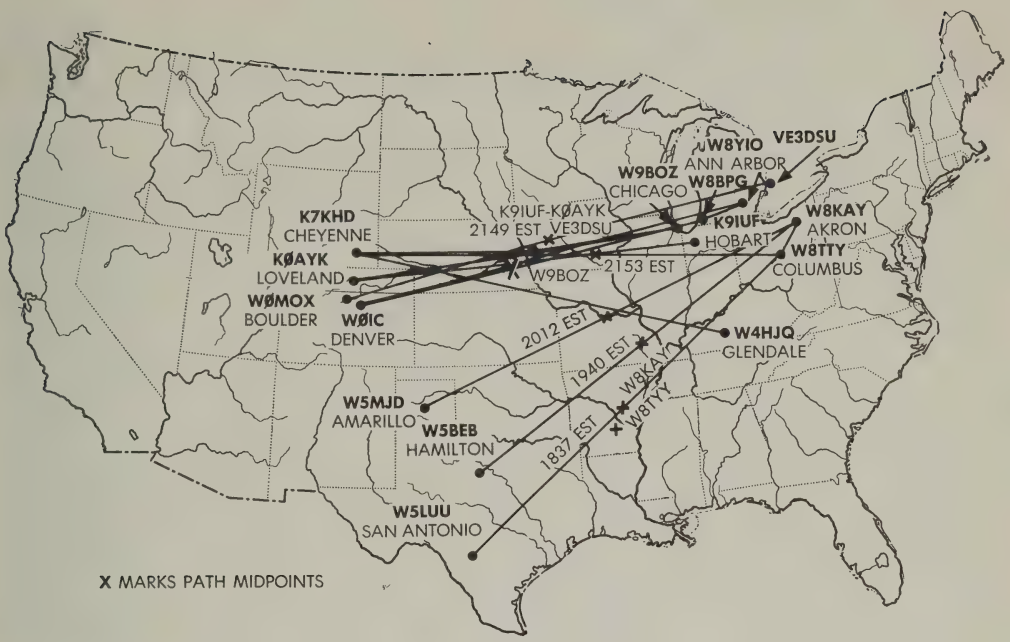
"**2258.** Signal on .053 to SW, weak, with severe QSB; unable to identify.

"**2315.** 50 Mc all but folded completely. End of hunt for Es on 144."

How would you have liked to have been in that session?

The date was 10 July 1961. All times given are in Eastern Standard. And that's not all the story.

The full roundup furnished by Art shows that he worked W5LUU, W5BEB, and W5-



OPENING OF JULY 10, 1961 showing straight-line paths and path midpoints of 2-meter contacts. Note that E-cloud apparently became dense enough to support 144-Mc signal about 1837 EST, over east central Arkansas, and then moved north by northwest at about 180 miles an hour. Unusual feature of opening was its duration—from 1837 EST until after 2200 EST! Both 1962 reported openings apparently also involved clouds over east-central Arkansas.

MJD, in the time between 1837 and 2012. An hour and a half later, at approximately 2149, he heard KØAYK at Loveland, Colo., calling K9IUF.

Art was not the only one enjoying the session. W8YIO, Ann Arbor, Mich., worked WØIC, WØMOX, and KØAYK but heard no other DX signals.

W8BPG, in New Buffalo, Mich., worked K7HKD in Wyoming.

W8TYY, Columbus, Ohio, worked W5LUU, K7HKD, and as Art reports "perhaps some of the other DX stations."

Western N.Y. stations K2LVR and K2KVN worked W5LUU but apparently did not hear any other DX.

VE3DSU, near Detroit, worked WØIC. VE3CIK, also near Detroit, heard and worked some of the DX but details were unknown to Art.

K2IEJ, on Long Island, said he may have heard WØMOX and WØIC but was not sure because of severe local QRM. W2AZL had the same report.

W4HJQ, Glendale, Ky., worked South Dakota and heard K7KHD.

W9BOZ, Chicago, heard the three Colorado stations.

And finally, K9IUF, Hobart, Indiana, near Chicago, reported working KØAYK (the call heard by Art earlier).

Now let's look at the report of this fray which appeared in QST (page 64, September, 1961, issue). "A cold front approaching from Canada and extending east from Wyoming toward the Lake Michigan area could possibly account for the WØ, W7 to W8, W9 opening. The Texas to Lake Erie opening had **no weather indications** . . ."

The accompanying map shows the paths covered by the QSO's reported by Art. The signals sound more like Es than tropo, in that no intermediate points were heard and even the 10-watt signal of KØAYK approached S9 in level; however, the lengthy duration of the opening makes it also appear **possible** (though not probable) that tropo helped some.

The answers might possibly lie in what K2TKN calls "a bank shot." Bill has found that frequently in attempting Aurora contacts he has best results pointing **away** from the curtain; his explanation is that tropo going **away** may be guiding his signal around to a better part of the Aurora, or, in other words (his), "I make a bank shot." Perhaps tropo conditions provided the same "bank shot" at an E-cloud, allowing it to be observed far longer than one would expect.

How did conditions correlate elsewhere during this opening?

The QST reports showed aurora present on the night of July 10, 1961, from WA2HFI to the Gulf area. Julian, W4YRM, in Madison, Tenn., reported working Pennsylvania, N.J., Texas, Colorado, Nebraska, Mass., Conn., N.Y., and Virginia by Es on Six between July 8 and 17 but gave no specific dates. K9PNP, in Indiana, reported a Six-meter opening on July 10 from his location to W2 and W3, plus Florida. That's all we could locate.

Art's report makes one conclusion which differs drastically from our recommendation in the January article:

"Recapping," Art wrote, "despite frequent checks of 50 Mc, no really short skip sigs were heard. Think this should be stressed. Think conditions on 144 are suitable for Es contacts **more often** than generally believed."

That same QST issue which carried Art's report originally also reported another possible Two-meter skip contact, between W1AJR and K9AAJ of Quincy, Ill.

Andy heard Michigan stations working into West Virginia, and Indiana stations working Pennsylvania, on 50 Mc at 2400 GMT on June 19, 1961, and began calling CQ on 144. Ten minutes later he made the contact; the QSO lasted about three minutes.

On this one, the tipoff was the hearing of 50-Mc short skip **at the other end.** Andy did **not** hear the short skip himself.

The tipoff for Art, on the other hand, was the extreme strength of signals from W5 land. (The Louisiana stations he heard calling Indiana on Six were not **really** short skip, but short enough to justify checkout.)

Incidentally, check those times of day again. Art's opening began shortly before sunset, local time, and extended until 11 p.m. Andy's occured at about the same time of day—near sunset.

Let's come closer to the present. Like last July 21. The time, 2030 to 2034 Central Standard time—just after sunset in northern Texas.

Our report comes from K5MBV and W5AJG; according to Ken, "Several of us mistook it for IF feedthrough. The entire two meter band was filled with strong QSBing signals from W3 and W4 stations, all the way to above 146 Mc." Ken noticed it first when a beat appeared on a near-local station he was working; the beat was a W3!

The following weekend, Leroy held a net check on the reported opening; six stations, scattered across northern Texas, reported hearing the strange doings.

Oddly enough, we have never received a report on this one from the other end. Will the W3 and W4 operators on the band the night of July 21 please check their memories and their logs?

And then, of course, there's our own experience in last June's VHF contest. You'll remember that one. Six was wide open to everywhere from the central states, and at one time we could count six separate stations coming in on Channel 6 of our TV monitor. And at 1855 Eastern Standard time—again, just at sunset—K4IXC, John, in Melbourne, Fla., "heard a phone signal which I identified as W5THT." This was the night of June 9. The misidentified (no W5THT is listed in the callbook) station was calling a W7 portable 5.

At 1755 Central Standard time, Russ Miller, operating W5KHT during the contest, called and worked W7JCU/5 in Oklahoma City. We had been, for much of the afternoon, attempting to raise someone to attempt two-meter E-skip, without luck.

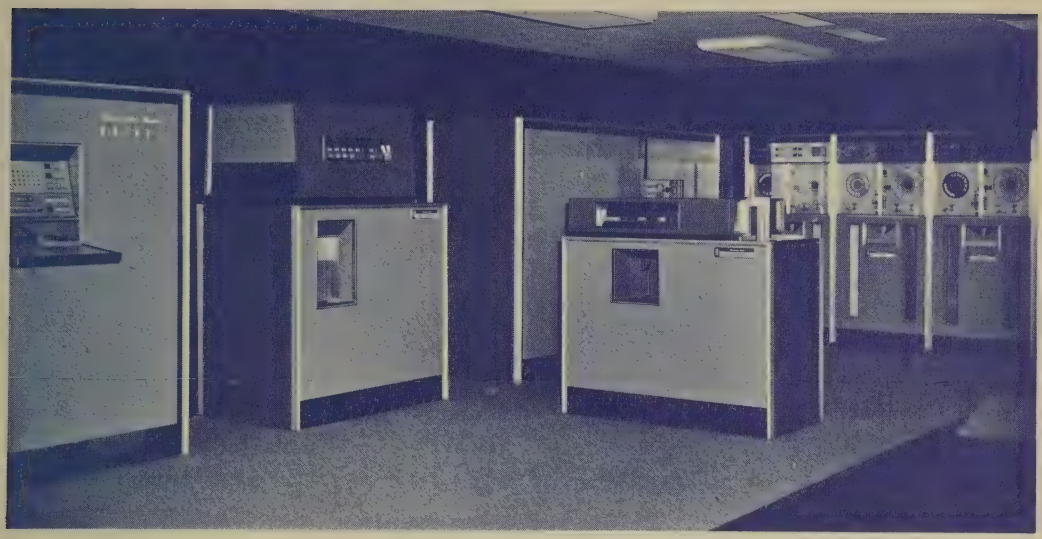
These are not all the recorded instances by any means. W5SFW has worked several two-meter DX stations on what appears to be skip. So have several other people.

But these we cite have **all** happened in the past two years; in the 17 years of looking, only some 20 previous instances had been reported.

And besides their recency, these all have something else in common—they happened near sunset local time!

We—all of us—still have much to learn about this phenomenen. The interest is there —your mail has proved it. We're interested too. What will we discover this spring?

About Univac . . .



One nice thing about modern technology, it never ceases to have side benefits to mankind. Take our (Horizons Publications) new UNIVAC installation. For all of our four monthly books plus our two semi-annuals and our annual, we now handle all subscriptions, billings, accounting and store re-sale copy orders using a UNIVAC system. Where one girl previously needed a day to process 300 subscription orders, we now do it in a fraction of an hour.

But about the side benefits: VHF Associate Editor Russ Miller (W5HCX) has been spending some time with our UNIVAC engineer of late discussing how UNIVAC might be utilized to study VHF propagation. Russ felt that if he could card-index a large enough cross section of VHF DX reports, he could let the machine tell us what patterns, if any, VHF DX took. A few weeks ago he brought us the results of his thinking. If VHF readers would contribute detailed DX data, he would spend time programming UNIVAC to see what we could learn about VHF DX. Maybe even predict it with a measure of accuracy. Now of course we haven't invested in UNIVAC equipment for this purpose. But Russ wants to tackle the project on his own on weekends in true ham pioneering spirit. So we say OK.

The last page of this heavy card insert contains a special reporting form for the four week period March 15-April 15. VHF readers who wish to contribute to W5HCX's project can start the ball rolling by completing the card as the month wears on and return it to Russ' attention. We'll have more detailed reporting forms for all UNIVAC Propagation Reporters in the months ahead, but this card will give Russ what he needs to get the project started. Even if you have no DX to report, file the card anyhow noting that you heard no DX, and indicating that you wish to become a regular U.P. (UNIVAC Propagation) Reporter. Russ will do the rest!

W5KHT

NEW SUBSCRIBER INSTRUCTIONS

Use top form (FORM A) to subscribe to VHF Horizons yourself. Use middle form (FORM B) to have a friend subscribe. Use bottom form to send us the call letters of VHF stations you hear on the air in your area. We'll send them a sample copy of VHF Horizons in hopes that they too will subscribe!

FORM A **FORM A** **FORM A**

___Enclosed is my check/money order for $4. Enter my 15-month subscription to VHF Horizons starting with the next issue to be mailed.

NAME _____ Call _____

Address _____

Town/City _____ Zone _____ State _____

Airmail to: VHF Horizons
P.O. Box 1557
Oklahoma City 1, Oklahoma

FORM B **FORM B** **FORM B**

___My VHF buddy has twisted my arm until I can bear the pain no longer. Enter my 15-month subscription to VHF Horizons in return for my $4.00 enclosed. Start me soonest.

NAME _____ Call _____

Address _____

Town/City _____ Zone _____ State _____

Airmail to: VHF Horizons
P.O. Box 1557
Oklahoma City 1, Oklahoma

FORM C **FORM C** **FORM C**

Here are some of the VHF-UHF'ers active in this area. See that they receive a sample copy of VHF Horizons with mucho speed.

Airmail to: VHF New Calls
P.O. Box 1557
Oklahoma City 1, Oklahoma

A NFM Adapter

by Jim Speck, W5PPE
1609 Glenbrook Terrace
Oklahoma City, Okla.

As a beginning step in a program of on-the-air weak signal checks of NFM vs. Sideband being undertaken at this station, in response to the recent articles in VHF, this adapter was designed to allow the station receiver to receive simultaneously SSB and NFM with no switching or modification to the receiver required.

The adapter plugs into the Q-Multiplier socket on the rear of the Drake 2B, and consists of one 455 Kc IF amplifier, a limiter, diode discriminator, and one stage of headset audio. The effect is to have two receivers, the 455 Kc FM "receiver" and the 455 Kc superhetrodyne "receiver" following the same tunable "converter," (the VHF converter and the Drake front end).

This means the tunable passband and product or diode detector in the Drake has no effect on the NFM reception, and may be set up as desired, namely zero beat with the (suppressed) carrier of the SSB or FM signal. Listening to NFM reception with phones over one ear, and the speaker turned up, the other station may switch back and forth between the two modes, and A-B checks can easily be made.

This unit will be available on loan to Drake 2B owners within SSB range of Oklahoma City who will report signal comparisons of scheduled six-meter beacon broadcasts of W5PPE, first SSB and NFM of comparable power level. Similar units may be constructed by those not wanting to wait on their chance at the unit, or for independent experimentation.

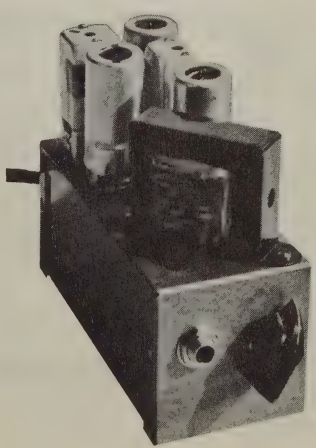
Of course, this adapter will give broadcast quality reception of other NFM signals such as from the Elmac AF67-68 series transmitters. All parts are readily available standard components, and the unit may be duplicated in three or four evenings.

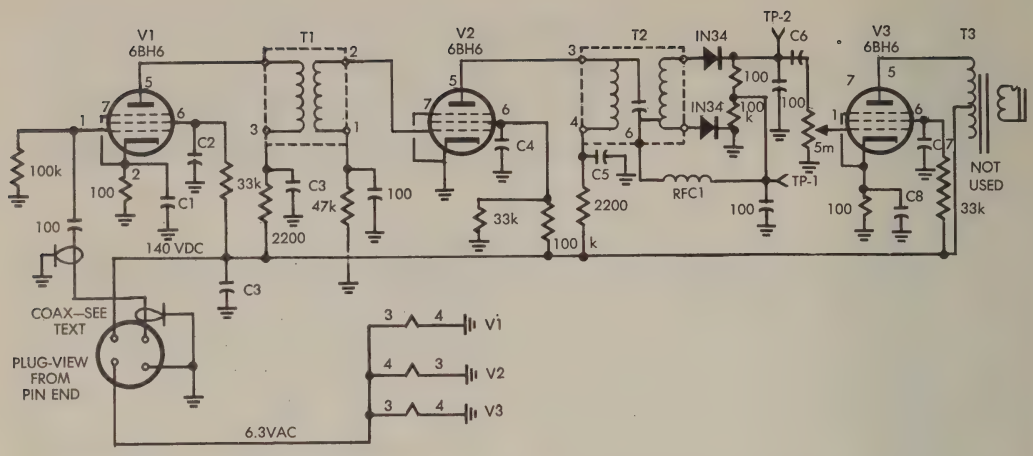
While the parts layout and wiring is not critical, hole layout is shown in Figure 1 for those who wish to duplicate this unit. The chassis is a 2¼ x 2¼ x 5 in. LMB utility box, which is just adequate. The Q-Multiplier plug is a Cinch-Jones 5AB2 battery plug. The 455 Kc signal is brought in with coax cable, which should be short, since its capacitance detunes the Drake's AM/SSB stages. The coax used in this unit was Amphenol Subminax 75 ohm, but RG-58 or 59 is also suitable although larger.

The detuning referred to above is bad enough to require retuning of the Drake T-2 IF can, if use on the Low-Frequency bands is desired. However, most VHF converters have plenty of gain to render this unnecessary for the purpose of these tests. If for a permanent installation, it is recommended this transformer be adjusted to compensate for the added capacitance.

After checking the wiring for errors, the unit may be plugged in and the receiver warmed up. Test equipment required for alignment is a DC VTVM (preferable to a 20,000 ohm-per-volt meter which can be used although it loads the circuit) and a source of unmodulated carrier (such as the crystal calibrator, your VFO, or crystal oscillator).

Tune up Procedure: A. Tune in the test signal and zero beat with the BFO and product detector on, listening on the loudspeaker. B. Connect the VTVM to TP-1 (I used a lug on the terminal strip for the TP), and adjust the slugs in T-1 for maxi-



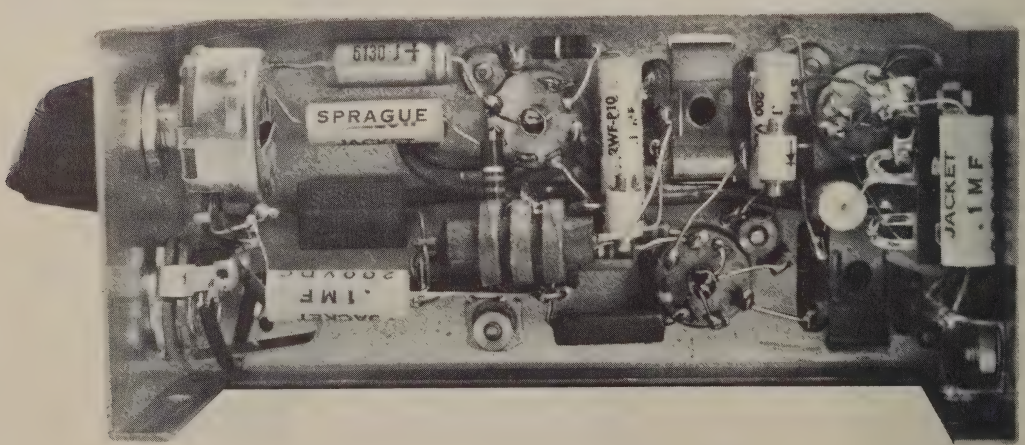


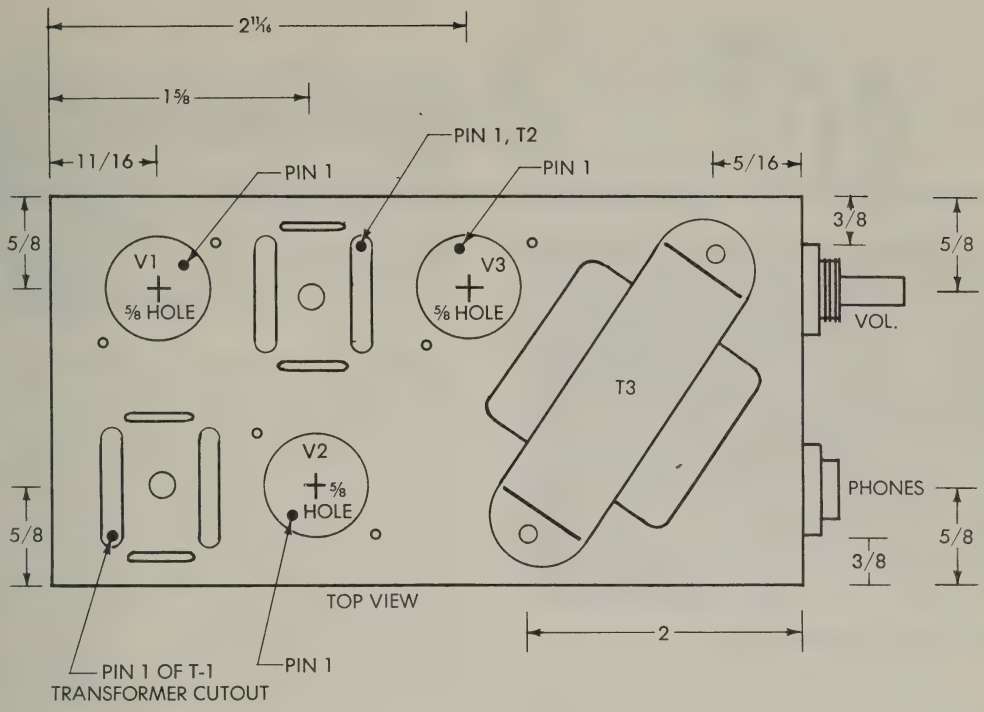
SCHEMATIC DIAGRAM OF NFM ADAPTER shows all wiring. Power is taken from Drake receiver. Nothing is particularly critical. Unless otherwise specified capacitance values without decimal point are in pF (micromicrofarads) and those with decimal point are in microfarads. Resistance values are in ohms; unspecified resistors are ½-watt composition units.

mum voltage, using an insulated tool. C. Next connect the probe to TP-2 and adjust the top slug in T-2 for zero D.C. voltage. D. Then vary the main tuning control of the Drake and note the frequency change to give a peak positive (one way from zero beat) and a peak negative (other way) voltage indications. If the bottom slug is properly positioned, the frequency deviation up and down will be the same for the peak readings on the VTVM, and the voltages at the peaks will also be the same, although one is negative and one positive. If this is not the case, change the setting of the bottom slug a little and begin again with step C above. A little juggling may be required, but it quickly comes in.

The peak separation, with the IF shaping given before the discriminator, is about 12 Kc with a linear response of about plus-or-minus 4.5 Kc. This is just a little more broad than optimum for a 3 Kc deviation, but the performance should not be degraded to any great extent.

On tuning the band with this adapter, you will discover it has a broad response to a signal, very noticeable in comparison to the 3.6 Kc position of the Drake's AM section. Also, some response to AM signals can be heard, except when tuned exactly on the signal (unless of course there is some incidental FM on the signal which is illegal on Six) although the gain control on the adapter must be well advanced to hear it. This has resulted in an unexpected bonus of being able to work local (AM) nets listening over the phones and not having to touch the dial!





PARTS LAYOUT for NFM adapter is shown in this drawing. See text for full details.

PARTS LIST

C1 0.1 mf 50V disc capacitor
C-2 thru C-7 0.1 mf 200V capacitors (Sprague 2WF-P10)
C8 5 to 10 mf 10V electrolytic
RFC1 10 mh ferrite-core RF choke (Miller 6306)
T1 455 Kc input transformer (Miller 12C1)
T2 455 Kc discriminator transformer (Miller 12C45)
T3 18K C.T. to 600-ohm 2-watt output transformer (Triad A-53X)
All 100-pf capacitors are silver mica.

Letters

Dear VHF:
I have a problem and perhaps you can give me a solution or tell me who might. I have converted an FMT-50D Motorola "coffin box" to 6 meters and AM with a transistorized modulator, but not only get AM but also FM. Everyone has to tune to the side of my carrier to copy the audio and thus the carrier goes down. If one tries to copy the audio at the center, it is distorted and bassy. I tried bypassing the modulator tubes, but the drive dropped to almost nothing. Thanks for any suggestions.

73,
Richard Jacobs, WA0AIY
1015 Glenside Place
University City 30, Mo.

Richard—
Haven't run into this problem here in the office; maybe some of the readers will have some answers for you. How about it, gang?

Dear VHF:
The following may suggest some stimulating thoughts on polarization during skip conditions within the VHF spectrum:
If the reflecting matter is off a considerable distance, either to the left or right, as opposed to the shortest path, horizontally polarized signals would then appear to be in a simulated vertical plane upon arrival at the other end of the circuit.
I have taken the liberty of presenting the above theory hoping it will be of interest to you and your readers.

Yours truly,
A. W. Poze, K6LEK

OM—
Thanks for the thought. Any of the slipstick crowd want to discuss it at length for us?

Dear VHF:
While I'm not a darn bit interested in VHF anymore, I take your magazine. I want to congratulate you on the fine circuit drawings in the January issue. I have been trying for years to get the magazines to print heavy line drawings so that we blind old timers can see them without going for our specs. Keep it up and don't let anyone talk you out of it even if you need more advertising space. Best of luck to your magazine.

73,
Ed Marriner, W6BLZ
528 Colima Street
La Jolla, Calif.

Ed—
We'll try! Wish you would reconsider all these megacycles we have up here—we'd like to have some of your fine copy in our pages!

Dear VHF:
Could you tell me where and at what price I can get a AM-33/ART transmitter as you had the dope on in the February issue?
I want to thank you for the fine way you are publishing your magazine. It is the best and I am sure glad I subscribed for it. If I had to take only one it would be VHF.

73,
Glen H. Adams, K0USB
118 South Main
Independence, Mo.

Glen—
Sorry we don't have (yet) a list of surplus houses handling the AM-33/ART. Maybe some of the gang can help us out along these lines; we'd like to know the name and address of every surplus house in the country so next time we have a "goodie" conversion article we can check and find out who has it. Listening, gang?

VHF Showcase

NOISE-CANCELLING MIKE

Noise-cancelling microphones can provide highly intelligible radio transmission from crowded, noisy locations, according to **Shure Brothers, Inc.,** 222 Hartrey Avenue, Evanston, Ill.

Shure reports side-by-side comparison tests of their 440SL standard mike and their model 488 noise-cancelling unit at ham stations set up in public fairs at Chicago. First tryout was at W9TEM, operated by Chicago Radio Council, Inc., during the International Trade Fair. Another, also at W9TEM, was at the National Electronics Conference.

Transmissions over the 488 could be copied easily even when a person standing near the operator could not hear his voice, Shure reported.

For full data on the 488 and other noise-cancelling units in the Shure line, write the manufacturer.

RECTIFIER REPLACEMENTS

They're not new, but many of us possibly haven't realized that silicon-diode units to replace vacuum rectifiers have come down to reasonable prices.

Sarkes-Tarzian Inc., Bloomington, Indiana, reminded us here at VHF of this by pointing out that their S-5251 unit, which replaces the 5U4, 5AU4, 5AW4, 5AZ4, 5T4, 5V4, 5W4, 5Y3, and 5Z4 tubes, sells for less than $7 net.

Their bulletin on "Tube Replacement Silicon Rectifiers" lists a number of other such units too—including one, the S-5344, which replaces an 872A! It's more expensive, though.

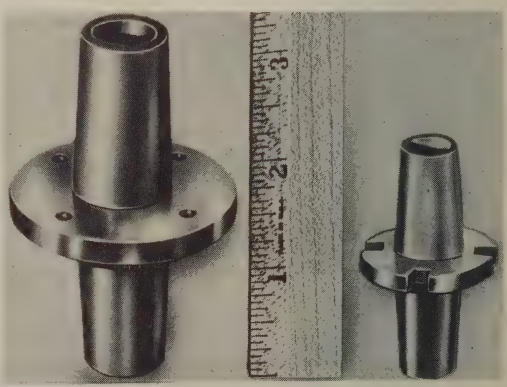
To get a copy, write to S-T and tell them we sent you.

A BRACE OF BOOKS

Howard W. Sams & Co., Inc., 4300 West 62nd Street, Indianapolis 6, Indiana, the book-publishing people, have announced three new titles which should be of interest to VHF/UHF minded hams.

They are "ABC's of Lasers & Masers," by Allan Lytel; "Handbook of Ham Radio Circuits," by David E. Hicks, W9CGA; and the fourth edition of Sams' "Transistor Substitution Handbook."

We'll be reviewing all three in the coming months, undoubtedly. In the meantime, if you'd like to know more about them, drop a note to Mal Parks at Sams and tell him we suggested it.



25-KILOVOLT CONNECTOR

A high-voltage connector insulated for 25,000 volts and capable of handling up to 20 amps has been announced by **Kalpa Scientific Laboratories, Inc.,** Dept. VHF, P.O. Box 172, Flemington, N.J.

Made of modified diallyl phthalate for superior arc resistance and low power factor, the connector is said to be easily mated with a standard banana jack for quick disconnect or with a 10-32 machine bolt for permanent service. They're available in 10 colors.

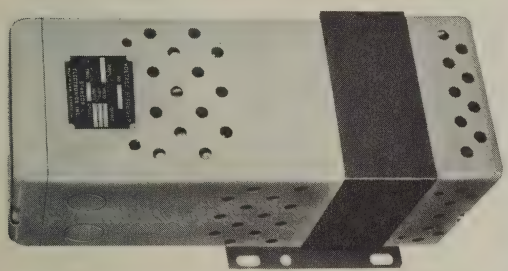
For more information write the manufacturer.

SSB TRANSCEIVER

Leo has done it again! Leo Meyerson, that is, at **World Radio Laboratories,** Council Bluffs, Iowa. He's come out with a SSB transceiver, the "Galaxy 300."

Though it's designed to cover only 80, 40, and 20 meters it should be a natural mate for the VHF "Transceiverter" described last September. WRL says it's the most economical (under $300) SSB transceiver on the market, and we won't argue (or agree either if some other transceiver maker is listening—we're just telling you what he told us).

For complete specifications on the 20-tube unit, drop Leo a line.



POWER REGULATION DEVICES

An extensive line of power regulation devices, to be marketed under the name "Powerguard," is being developed by **Stancor Electronics, Inc.,** 3501 Addison Street, Chicago 18, Ill.

First such units will be automatic line voltage stabilizers, holding line voltage variations within 1 percent for 15-percent variations on the input side.

The units will be available in 30, 60, 250, 500, 1000, and 3000 VA ratings. They will be stocked by Authorized Stancor Industrial Distributors.

For additional data, write to Mr. Roy Horstmann, industrial sales manager, at Stancor. Tell him we sent you.

COOLING FAN BULLETIN

A new 4-page technical bulletin containing complete specifications on the super-silent Whisper Fan for cooling electronic equipment has been released by **Rotron Mfg. Co., Inc.,** Woodstock, N.Y.

The bulletin contains performance curves, application and mounting information, dimension drawings, and OEM selling prices.

Write to Rotron and ask them for technical bulletin No. E-2801

MIDGET INDICATOR BULB

An indicator bulb so tiny that it would take a hundred of them to cover a penny has been introduced by **Aristo-Craft Distinctive Miniatures,** 314 Fifth Avenue, New York 1, N.Y.

Less than 1/16-inch in diameter and only 3/16-inch long, the tiny bulb is available in various voltage ratings. Suggested uses are as indicators, tuning pointers, etc. Price is said to be exceptionally low.

For full data and specifications, drop a note to Mr. M. Hubert. Aristo-Craft caters to hobbyists as well as engineers.

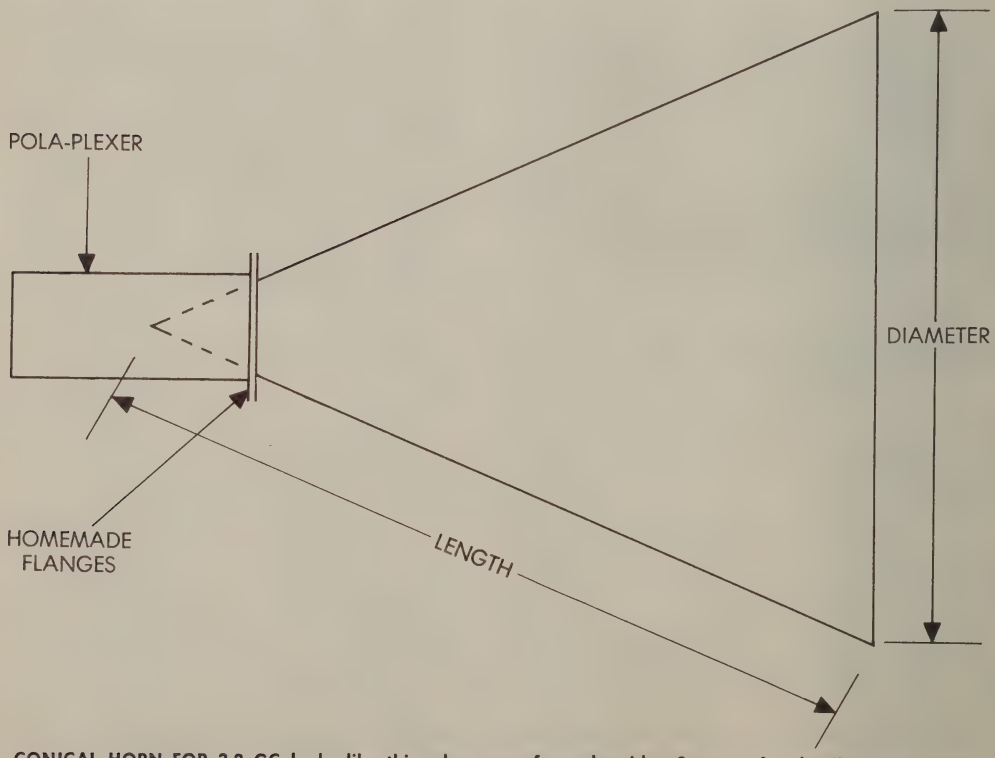
3300 Mc Conical Horn

The conical horn can be constructed by anyone with a large piece of metal (even galvanized iron), a good pair of tin snips and a hot soldering torch. To many, the conical horn looks like an overgrown funnel. It requires no focusing and if long enough will produce an excellent antenna pattern.

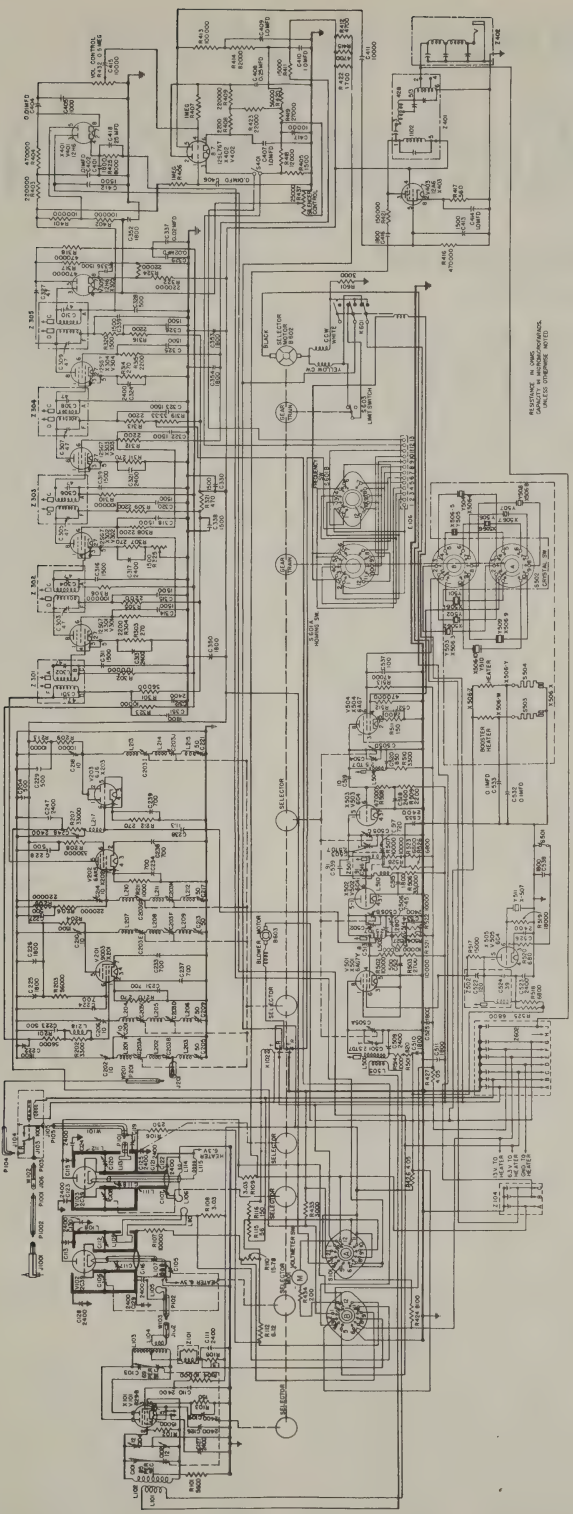
The basic disadvantage of the conical horn is that the length becomes very large when a large aperture of high gain is desired. For an optimum gain conical horn (a conical horn with a maximum gain for a minimum length) the length is related to the mouth diameter thusly: LENGTH = DIAMETER SQUARED / 3 x WAVELENGTH.

One can see, by running the equations through the mathematical mill, that a 12-inch diameter 3300 Mc conical horn should have a length of 13 inches and will yield about 18 db gain over an isotropic radiator. If the diameter is doubled, the length must be quadrupled and the gain will be increased by 6 db; i.e. 24 inch diameter, 54 inch length, 24 db gain and so on. It is obvious from these examples that the length becomes large as the gain is increased, but if the length for a given diameter is decreased, the horn efficiency decreases, and the side-lobe structure becomes larger.

However, this antenna is the easiest type for the home constructionist to fabricate and is recommended if a parabolic reflector is not available. The technique is identical to the construction of an ordinary funnel, with the small opening designed to fit the feed system.



CONICAL HORN FOR 3.3 GC looks like this when seen from the side. See text for details of size; refer to October, 1962 issue of VHF for details of Pola-Plexer feed arrangement.



SURPLUS SCHEMATIC of the month from W6NLZ/A6NLZ is this one of the MAR unit. John promises more in the months ahead; sorry we have no additional data on the unit but John has described two separate conversions of it in past issues.

An Unusual 6-Meter Preamp

by Joseph Marshall, WA4EPY
Ozone, Tenn.

Most hams working the 6-meter band use amateur band or general coverage receivers. Those which do not cover the 6 meter band are preceded by converters. There are several amateur receivers which do cover the 6 meter band barefoot. However, most have a relatively poor noise figure on 6 and therefore the sensitivity is considerably below the optimum. The simplest way to improve 6 meter sensitivity of these receivers is with a preamplifier with a good noise figure. In this way the sensitivity can be made as good or better than that of receivers with converters ahead of them.

However, the increased ham population on 6, especially in the metropolitan areas, and the rapidly growing trend to higher powered transmitters, has raised some very serious problems with "overload" or "Cross-modulation" of receivers when they are preceded by preamplifiers. The usual preamplifier using a triode in a neutrode or cascode arrangement is so prone to overload that the added sensitivity is often useless when a nearby 6-meter station comes on the air.

The overload or cross-modulation is the result of two factors. First, the added gain of the preamplifier pushes a much larger signal into the input of the receiver and thus may overload it. Secondly, and more often, the overload occurs in the preamp itself because most preamps use sharp cut-off triodes which are easily overloaded and when overloaded turn into detectors or mixers.

High sensitivity and a fine noise figure are obviously not very useful if they cannot be realized a high percentage of the time. Therefore, the objective in a preamplifier must be a combination of high sensitivity plus high immunity to cross-modulation and overload. The preamplifier described here provides sensitivity which is only about 1 db poorer than that of an ideal receiver on 6, has very high immunity to overload and cross-modulation, and, as a bonus, is considerably less critical to put together and much more stable than the typical neutrode or cascode.

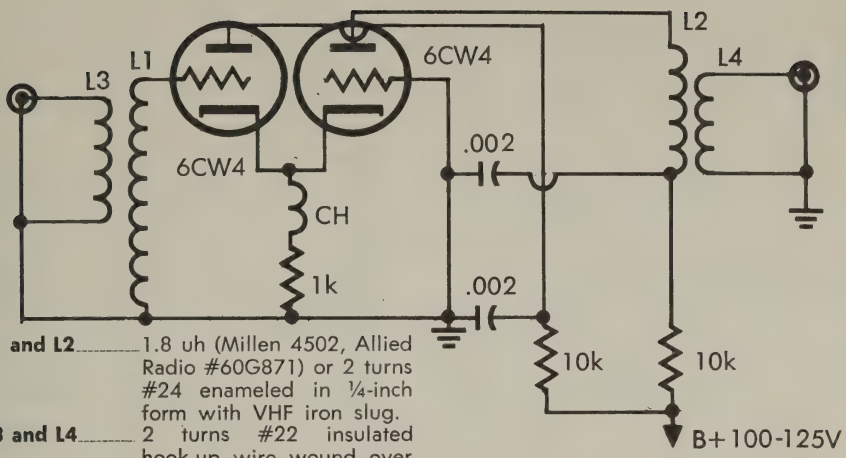
THE CIRCUIT

The cathode-coupled RF amplifier of Figure 1 has received very little attention. There is only one commercial application to my knowledge — in the Dynatuner. In the standard texts and handbooks it is dismissed with a once over lightly comment which stresses that the noise figure and gain are both poorer than that of the same tube as a grounded-cathode amplifier. This criticism is valid but exaggerated. The **theoretical** noise figure is poorer but the **practical** noise figure is not much poorer.

The first section, being a cathode follower has no gain and indeed a small loss. The second section is grounded-grid and ordinarily one cannot expect as much gain from a grounded-grid as from a grounded-cathode stage. However, as in the case of the cascode, there are features in this configuration which are not obvious at first sight and which result in a better noise figure and more gain than most people believe.

The cathode follower input tube, while it has no gain, does have a very high input resistance. If a tube with a high input admittance is used the result is extremely light loading of the input tuned circuit and therefore a much higher effective Q and higher transformer ratio. As a result, a given signal delivered to the antenna has a much higher value at the grid of the cathode follower than it has at the grid of either a grounded-cathode or grounded-grid amplifier.

In practice, within the 30 to 100 Mc range, this may amount to a 10 db improvement in Signal-to-Noise ratio. This helps to make up for the lack of gain, and while the grounded-grid section sees more noise that it would connected directly to the antenna it also sees a higher signal. It also develops more gain than when fed by an antenna directly, because the cathode load provides a better impedance match. As a



L1 and L2—1.8 uh (Millen 4502, Allied Radio #60G871) or 2 turns #24 enameled in ¼-inch form with VHF iron slug.
L3 and L4—2 turns #22 insulated hook-up wire wound over L1 and L2.
CH—1.8 or 2.2 uh choke (allied Radio #57G865) or 20 turns #24 enameled on 1-W resistor
J1, J2—BNC or 83 type chassis connectors, or phono jacks.

FIGURE 1

result the overall gain can be 20 to 26 db in a wide band amplifier which is quite comparable to the gain of a neutrode triode and quite sufficient to bring the sensitivity to ½ microvolt or better, providing the noise figure is good enough.

The need for very low noise figures on 6 meters is greatly exaggerated. In a very quiet location, where there is little or no man-made noise, and using directive beams with gains of 10 db or more, the cosmic noise level at its lowest amounts to an equivalent noise figure of 6 db. Calculations, which we will not go into here, will show that a receiver noise figure equal to the noise figure of the cosmic noise at a given frequency results in overall sensitivity only some 2.7 db poorer than that of a perfect receiver; and a noise figure one-half that of the cosmic noise yields a sensitivity only 1 db poorer than that of the perfect receiver.

It may have been difficult to achieve noise figures in the 3 to 6 db region two or three years ago with a cathode-coupled amplifier, but it is no trick today. It is quite possible, for example, by using a pair of 6CW4 Nuvistors to achieve a noise figure of less than 3 db in a cathode-coupled amplifier. The difference in performance between such an amplifier and the optimum neutrode with a possible 1 db noise figure, is completely indistinguishable since the difference in actual sensitivity will be a small fraction of 1 db, when the two are used with an actual antenna in space picking up cosmic noise.

Furthermore, the cathode-coupled amplifier has two big virtues which provide sizeable bonuses. First it is the most uncritical and stable of all RF amplifiers, not excepting the grounded grid. So far as the tubes are concerned the isolation between input and output is complete. There is no capacitance between input and output except that contributed by the wiring. The only possible source of coupling between input and output is through the input and output tanks. If this is minimized by proper placement of the two coils, the circuit will be stable and oscillation or regeneration cannot occur. This is another reason why in practice the cathode-coupled amplifier has a noise figure little if any inferior to that of a neutrode or cascode. A neutrode or cascode which is regenerative will have a poor noise figure — and very few high gain preamplifiers are carefully enough neutralized to prevent regeneration throughout the operating range.

But for our particular purpose, the great advantage of the configuration is its high immunity to overload. It is virtually impossible to overload it with anything short of a signal of several volts.

This does not mean that complete freedom from overload and cross-modulation will be achieved. The receiver itself can still be overloaded and, indeed, the additional gain of the preamp makes this more

likely. But in general the overall immunity to overload is almost entirely a factor of the receiver characteristics. In other words, the cathode-coupled preamp will give additional sensitivity without making the receiving setup significantly worse from the point of view of overload than it is when running barefoot. More than this no preamp can do, and very few can do it as well as the cathode-coupled preamp.

PRACTICAL MODEL

The diagram of Figure 1 shows a prototype of a practical preamp for 6 meters using a pair of 6CW4s. The gain is about 26 db for a 2 Mc bandwidth and about 20 db for a 4 Mc bandwidth. The noise figure can be adjusted to less than 3 db if a noise generator is available and will not be much worse than 4 db if the preamp is peaked on cosmic noise. Ahead of an SP600 receiver, it is possible to work a 10 microvolt signal within 25 Kc of a 100 millivolt signal, and a 1 microvolt signal within about 200 Kc. There are no spurious responses. The effect of the interfering signal is to reduce the receiver gain as it comes close to the receiver band-pass. It would be possible to work duplex with separate receiving and transmitting antennas and a separation of about 200 Kc, assuming the receiver and preamp are both well-shielded and there isn't too much stray RF in the shack.

Although the suggested layout is logical it can be varied without too much risk of trouble. Here, for example, a shield is used between the two sockets to isolate the input and output coils. The shield could possibly be dispensed with if the coils were mounted at right angles to each other. On the other hand, the shield provides a very convenient central wiring distribution and grounding point.

The two sockets are mounted close together and oriented so that the grid of the first tube will be close to the input coil and the plate of the second close to the output coil. The common heater and cathode connections are made through very short lengths of insulated wire passing through small holes in the shield. All bypass grounds are made to one point — the anchor point of the terminal strip on the shield. The terminal strip is grounded to the shield by soldering to the shield, rather than with a bolt and nut. The grounded grid and heater terminals are grounded right at the socket terminals.

I have found the phenolic base Printed Circuit board with copper foil on both sides a very convenient chassis for VHF work. It is easily drilled and grounds can be soldered directly to the foil with a small soldering iron or gun. Only one precaution is necessary. The two copper sides must be joined together somewhere, otherwise the chassis would be a large capacitor and instead of a direct connection between top and bottom we would have a capacitative one.

Here they are bonded together at the sockets, which are soldered to the upper foil at the mounting lugs, and to the bottom foil at the metal rim of the socket. The bolts fastening the input and output coax connectors also bond the two foils together.

No attempt was made to insure minimum losses. The coils were wound on forms with high frequency slugs and relatively small wire. Larger coils with larger diameter wire would undoubtedly be more efficient though the difference might not be very noticeable. The standard commercial coils listed offer the simplest means of obtaining the tanks; but if you have a grid-dip meter you can wind any coils that will resonate within the 50-Mc band with the tube capacitance. The best procedure is to wire the other components into the circuit before dipping the coils. Then dip the coils with the tubes in the sockets. It is best to trim the coils so that they will resonate in the middle of the band with the slugs about half way in. The hot-tube capacitance will be slightly different from the cold-tube, and if you do not leave yourself some tolerance you may find that one coil or the other resonates outside the band and maximum gain cannot be achieved.

Adjustment is simple. Peak the antenna coil at about 50.5 and the output coil at about 51.5 for a 2 Mc bandpass; or 51 and 52.5 for a 4 Mc bandpass. The light loading of the input coil will be very evident when doing this because the resonant peak will be quite sharp. A signal generator feeding a very low level signal is best for this but peaking for maximum noise when the receiver is tuned to these frequencies will do.

The coupling of the link on the antenna coil is very important. When it is placed over the grid coil do not twist it so tightly that it cannot be moved. The simplest way to change coupling is simply to move the coil up and down the grid coil. The best way to do this is with a noise generator for the best noise figure. However, if you adjust it so that the antenna noise is loudest,

or a very weak signal is most readable, you will be close to optimum. In the prototype a position almost exactly in the middle of the coil turned out the best noise figure—2.7 db.

The preamp will require 100 to 125 volts at around 15 Ma maximum. This can be stolen from an appropriate point in the receiver, if it has no accessory socket. If the available voltage is higher than 125 volts a series resistor should be added to reduce it to between 100 and 125. The optimum voltage appears to be about 80 V at the plates of the Nuvistors.

Although the cost of two Nuvistors is obviously greater than the cost of one, there is a saving in other parts and the total cost will be little more than that of a neutrode type preamp and less than that of a cascode. The sensitivity will be fully as good and the immunity to overload nearly complete.

The problem of overload in converters can be treated similarly. A converter using a cathode-coupled RF stage into a cathode-coupled mixer would have much higher immunity to overload than the usual neutrode RF and triode mixer configuration. The noise figure would probably not be quite as good as that of the preamp feeding an RF stage because the mixer would make a noise contribution, but it can probably be held down to 6 db. This will still yield pretty close to the optimum sensitivity possible on 6, and less than 2 db poorer than that of the best possible practical converter.

The configuration can be used on 2 meters although the noise figure with Nuvistors will not be nearly as good. A pair of 417As, however, would yield results at least as good as those in a two-stage grounded-grid arrangement.

The arrangement can be useful in a booster on the FM band for one or two stations within a couple of megacycles of each other in locations where proximity to a powerful local FM station causes troubles with ordinary boosters. A cathode coupled booster covering the entire 20 Mc would be difficult to achieve because of the high Q of the input coil and the gain would be very small, unless the two tanks were tunable and could be peaked for any station in the band.

A frame-grid double triode, like the 6DJ8, will provide performance quite close to that with two Nuvistors.

But for 6 meters, the cathode-coupled configuration provides just about the optimum combination of noise figure, sensitivity and freedom from overload and cross modulation that the state of the art permits today at any reasonable price.

Another SSB Mixer

By Ken Holladay K6HCP
1109 Norval Way
San Jose, Calif.

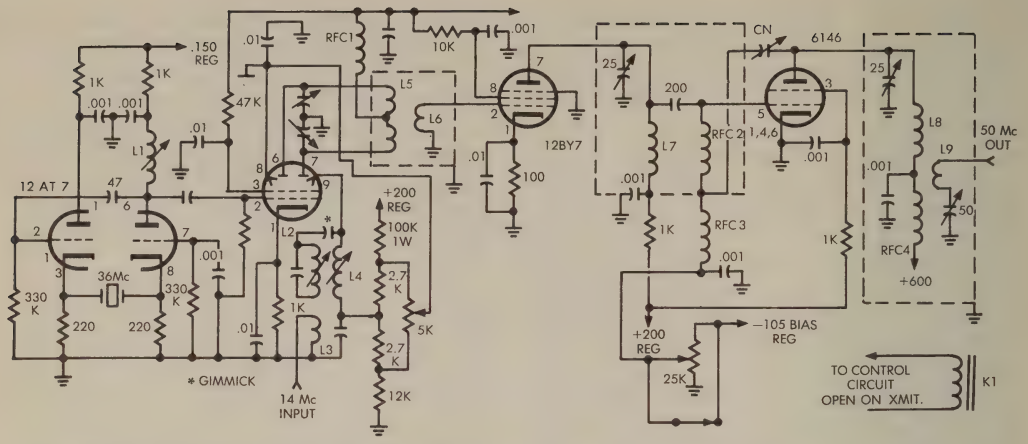
I am going to describe a more complex mixer than has been presented before for getting on 6 meter SSB. The reason for the complexity is that it is not a "power mixer." It is a true low-level, low-third-order-distortion, and low-frequency-drift mixer.

After being on 6 meters for 3 years with a 6360 power mixer and listening to the new SSB signals that appeared on the band from time to time, it became evident that a more sophisticated mixer was necessary to minimize drift and distortion, so I set out to build a good SSB mixer.

First the problem of drift in the 36 Mc crystal oscillator seemed easy enough to solve by using a Butler oscillator. It requires low crystal current, thereby cutting down crystal heating. The crystal and the plate tuning are isolated so changes in output tuning do not pull the frequency. This circuit also works well with overtone crystals.

Next came the problem of the mixer. After scrounging through the tube manuals, it was decided that the RCA 7360 beam deflection tube was the best bet. First it is a tube designed to be used as a mixer; it requires low drive, isolates SSB input from the crystal oscillator (no pulling with modulation), provides cancellation of the 36 Mc signal (a cause of T.V.I. 36—36—72) (72—14—86) (72—14—58) and gives low third order distortion.

The only drawback with the 7360 is the output voltage which is not high enough to drive a power amplifier. After some con-



SSB MIXER SCHEMATIC shows wiring of unit. Unless otherwise specified capacitance values without decimal point are in pF (same as micromicrofarads) and those with decimal point are in microfarads. Resistance values are in ohms; unspecified resistors are ½-watt composition units.

sultation with Jay, K6HUM, who was building a similar system, a 12BY7 in class A was put in to act as a voltage amplifier.

Finally a 6146 power amplifier was added. This provides enough signal to use on the air directly or to drive a high power grid driven linear.

Circuit Description

Butler Oscillator: The Butler uses a 12AT7. One half of this is used as a cathode follower driving through the crystal to the other half of the tube which is run grounded grid. The G. G. plate which is tuned to the crystal frequency supplies the oscillator output and regenerative feedback to the grid of the cathode follower and presto, it oscillates! The output is also taken from this plate.

The only adjustments are the values of the cathode resistors. These should be reduced to a point where the oscillator has a minimum output but still oscillates satisfactorily and will start all the time. The values shown should be all righ for most oscillators.

7360 Mixer: The oscillator is coupled to the first grid of the mixer. The SSB is coupled through a bandpass transformer to one deflection plate. The deflection plates are also connected to a DC network which is used to balance the plate currents for best oscillator-frequency rejection in the plate circuit.

The plate circuit is connected in push-pull, with the output taken from the center of the plate coil.

12BY7 Amplifier: This stage is driven from the 7360 plate circuit through a two turn untuned link. The output is capacity coupled to the grid of the 6146.

6146 Amplifier: The grid circuit is a Z-50 with the neutralization stub taken from the cold end. A small RF choke was put after the Z-50 to develop enough RF for neutralization. This is then decoupled and goes to a bias supply. The screens are run at —200 volts regulated. The regulation is a must.

Miscellaneous Things: Shielding is necessary around the final, as well as 12BY7 plate and 6146 grid circuits and the 7360 plate and the 12BH7 grid. The gain through the 12BY7 is so high that any little RF signal in the proper phase will make the mixer oscillate.

You will note in the pictures that I did not fully enclose the grid circuit of the 6146 or the 7360 plate circuit. The reason is that when I laid out the mixer it was not known that such extensive shielding would be necessary so I had to put it in place after assembly.

In the picture you will also note there is a copper strap on the 6146 tube socket. This was put on in an attempt to stabilize the mixer but the problem was solved with the addition of the shielding.

The pictures also show the neutralizing stub closely coupled to the plate circuit. This is because there is very little RF at the cold end of the Z-50 in the grid circuit. A smaller stub or a variable capacitor could be used if the grid circuit were changed.

The small butterfly in the 7360 plate circuit is inconvenient to use but it was the only butterfly I had when I built the mixer.

In the original layout I had lots of room and things were not so crowded, but with the addition of the 12BY7 and the shielding things got a little messy. The pictures do not show much detail but they do give the basic layout and show my mistakes which you should be able to benefit from and you should come up with a good clean layout.

The small relay in the bias circuit of the 6146 is to bias the tube completely off during receiving since the gain of the system is so high that mixer noise gets into the receiver. This relay can be anything that is compatible with your own system.

Adjustment

Turn on the filaments and check to see that there is at least —50 volts bias on the 6146. Turn on the B-plus to all stages except the plate and screen of the 6146.

Using a grid dip meter, adjust the 36 Mc oscillator for maximum output. If it does not oscillate, increase the value of the two cathode resistors.

Next, look for a 36 Mc signal at the plate of the 7360. Adjust this for a minimum with the deflection plate balance control.

Apply a 14 Mc signal to the bandpass transformer. (This does not have to be very big. I am driving the mixer to full output with a C. E. 10B swamped with 22 ohms). Adjust the transformer for maximum signal. Later the coils can be stagger tuned so you can VFO around without retuning these stages.

Tune the 7360 plate and 12BY7 for maximum signal.

Now, with the G.D.O., adjust the neutralization stub for minimum, signal at the 6146 plate circuit.

Turn off the drive and apply B-plus to the 6146 plate and screen. Adjust the 6146 bias to get 23mA plate current.

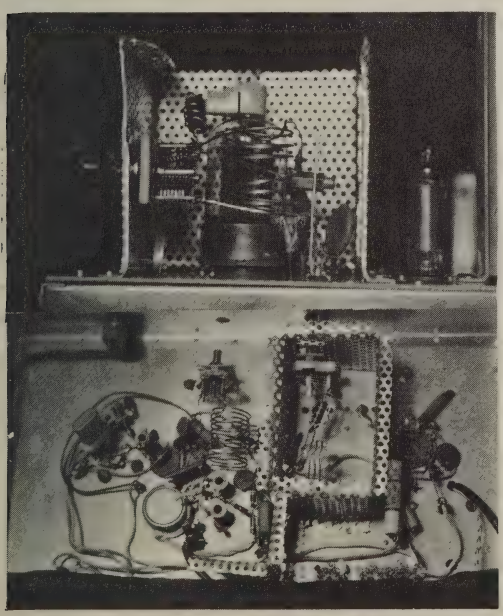
Turn the drive back on and adjust the plate and the loading condensers for maximum output. If you bowed toward Mecca and had your fingers crossed, you're now on the air.

It is interesting to note the very low driving power required. It makes this unit a natural to use with any very low power 14 Mc SSB generator, either tube or transistor type.

Be careful not to overdrive the unit. This can be seen when the output stops increasing with an increase in drive and the

Well, that's it. I hope the mixer works as well for you as it has for me. It's a good low power rig as well as a driver. It appears to be free from TVI without the use of a filter.

I would like to thank Jay, K6HUM, for the help with the voltage amplifier, and Phil, WA6FCH, for the pictures and all the on-the-air checks.



COIL DATA

L1	15 turns No. 22 on ¼-inch dia. form
L2	30 turns No. 26 on ¼-inch dia. form
L3	3 turns No. 26 at cold end of L2
L4	30 turns No. 26 on ¼-inch dia. form
L5	10 turns No. 16, ¾-inch diameter
L6	2 turns No. 16, ¾-inch diameter
L7	3 turns No. 16, ¾-inch diameter
L8	3 turns No. 16, 1 inch diameter
L9	3 turns No. 16, 1 inch diameter, at cold end of L8
RFC1	National molded choke, 6.8 microhenries
RFC2	Ohmite Z-50
RFC3	Same as RFC1
RFC4	Ohmite Z-50

MIXER DETAILS are shown in the photos at left. Upper photo shows top-chassis wiring of 6146 output stage. Lower photo shows under-chassis arrangement. Shielding doesn't look so neat but works well and is inexpensive.

Vital Happenings & Facts

OPERATING AND DX NEWS

WATCH THE BAND!

That time of year is rapidly approaching again. DX season.

Is there a six, two, 220, or 432 heart so heavy that a bit of summertime DX will not lift its heavy burden? We think not.

We are reminded of the many openings, especially in the south and mid-west, that go practically unnoticed on two meters and above. Down in the south and throughout the mid-west DX types are forever reminding us to have the gang tune the band(s) more often. We have a letter on our desk at this moment from a W5 in the deep south who bemoans the apparent backwardness (as he puts it) of the WØ stations in Iowa on two meters.

Seems this W5 type spent a frustrating several hours one evening last summer listening to an Iowa two meter net in which 50% of the Iowa stations were solid copy, with the 522's and ground planes or dipoles. Of course he didn't have the particular crystal to get him on net frequency (he has since gone VFO on two!), so he did his best to attract their attention (or anyone's attention) down the band several hundred kc's!

He still needs Iowa for two meter WAS.

All of which boils down to a little diligence on the part of more of us to give the band an adequate tune whenever we hear the semi-local stations running even an S unit above normal. It's surprising what old man weather will stir up for us if we would only look around to see what is taking place. Too often we get inclined to tune with the RF gain turned way down so the local block buster signals won't wrap the cans around our noggin. Only to miss the real choice DX signals that are riding over the noise one to several S units.

With all of the new interest in six and two sideband, and the usual beam raising parties that dot the land in April, there is no good reason why we shouldn't add a few new states in the next 8 weeks.

If we would all only tune a little more before calling CQ, and then tune the band with everything cranked wide open before we shut down for the night.

DX NEWS

The DRP program is in full, full swing. It looks like we may make WAS-DRP one of these fine months soon. This month we have DRP reports from 30 states and all Call-Areas on hand as we deadline our report, and dozens more coming in daily. Don't forget to send yours along this month!

144 Mc activity was highlighted by the League's SS contest. K1WHS/K1WHT, Westport, Connecticut reports working W3KKM, W3KMN, W1KSI/1, K3KMV, K3GAS, W1VNH (Mass.) and W3TBH during the contest. The same station added a super stability VFO for two and an audio filter with 100 cycle selectivity for DX work.

K1QIC in Maine added a 144 quad antenna, re-worked the two meter rig, modulator and VFO, but reports no DX heard or worked.

W1AHE in Stow, Massachusetts, reports working 6 New England sections during the SS with just 18 watts. 5 other sections were heard on the 24 element beam, 417A converter into his Skysweep converter, but not worked.

WA2ONO, East Meadow, New York reports good activity during the SS and notes copying a VE3 and K8 station while the festivities were on. The VE3 was S3 in bursts while the K8 was a steady S4. Sideband in the area is congregating on 144.-100. W2GMT is now on, using NBFM.

W2EIC/2 in Manhasset, L.I. reports working 532 stations in the SS using six and two meters. A 144 Mc Linear was recently completed.

K3OQP, Uniontown, Pennsylvania is building up a pair of 4X150's for 144 and reports a long string of new calls heard on the air in his locale.

K4YZE votes for more and better articles on converting surplus gear for VHF-UHF, and notes he finished up a tank-air

two meter balun for his Marietta, Georgia station. K4YBL, Fort Lauderdale, Florida has a VHF panadapter about ready to go. He's in the process in getting going on VHF SSB.

W4HHY, Nashville, Tennessee is working on a 2-meter SSB mixer. He wonders where he can find an AM-33/ART unit such as was described in the February issue of VHF.

W4BUZ, writing in the North Carolina **Ragchewer,** notes on the subject of crystal control on VHF, "If you are crystal controlled and happen to get tromped by a VFO, as I did, there is no support for a gripe because we don't own frequencies of our own. Personally, I use 10 surplus crystals which cost me $6.50 and if you don't think I can change 'em fast, just watch! And, I may have clobbered you with my VFO, too, but like the others, I moved off frequency when the contact was over. In the recent SS contest it was necessary to call a station on the frequency used by the station last worked in order to get him, which is DC band practice. Calling him a megacycle away was wasted effort until everyone else had worked him. The big secret is in 'Who acquires the station's attention first.' Avoid pile ups. If you don't get him the first or second try, don't waste 30 minutes beating your brains out. He wants your contact as badly as you want his and will count just as much after the smoke clears. Don't be a one crystal operator, and most of all, avoid 145.350. W4VHH was heard in Greensboro on this spot miserably clobbered by 5 stations he, of course, couldn't hear. And, don't be guilty of a ragchew between 145.0 and 145.4 or you are a meanie even if you are within your rights in the eyes of many."

W5BEP, Longview, Texas has completed a heterodyne converter for 144 Mc SSB, and has the 500 watt final working well. W5-IQE is reportedly getting on 144 Mc SSB with a T-23 converter and 829-B final.

W5WAX, Muskogee, Oklahoma reports adding AMECO converters for two and six as well as converting a Heath Seneca to plate modulation. Stations in Kansas, Oklahoma, Missouri and North Texas were worked during the SS.

Rex, W5RCI, Marks, Mississippi reports finishing up the 144 Mc SSB exciter, and work progressing on the 4X250 final. Rex is also adding RTTY to his two meter installation.

VHF'ers in the California area are planning a real get together at the Fresno Hamfest-Pacific Division Convention combination. Gib, W6BJI, and Alan, W6FZA, are working up a super program. The convention is scheduled for May 18 at the Towne and Country Inn. The Fresno Amateur Radio Club is in charge of the event and it is always one of the best in the west. You can get full data from the F.A.R.C. at P.O. Box 783 in Fresno.

WB6AOW has completed a conversion making a 4X150 surplus rig into a Linear for 144 Mc. He has also been working through the S.F. Bay Area MARS repeater as well as into stations in Bakersfield, Santa Maria and Brackenridge.

WA6OPG, North Sacramento reports running a 417A converter on two, with a Heath Seneca transmitter. The antenna is a 24 foot long 13 element yagi.

W6ILL is new on two with a 75 watt rig and an FCV-2 converter from International Crystal Mfg. Company. He's in Los Angeles.

WA6YOB, San Rafael, California notes conversion of a Link 2240 unit from mobile to AC operation, to be used through the FM repeater now operating on two in the San Francisco Bay Area.

WA6TBL, Campbell, added RTTY gear during this past month.

WA6USW reports installing a Heath Pawnee for two meter mobile operation and a 16 element beam for base. He's in Santa Ana.

WA6SSK, Los Angeles, has finished up a 8 by 16 foot shack for a good winter-time project, and is now working on some high power for VHF.

K6SWO, Daly City, California put up a Slot Antenna and slotted feed line for two.

K6VCO, Riverside, installed a 5 element beam, Nuvistor converter and 2E26 transmitter on two.

W7KRW (ex WØITO) is working to get back on the air in Mesa, Arizona. He plans a complete VHF installation.

WØVKH is another slant 7 operator. He's active from Reno, Nevada in case you run across his call.

K8ANG, Warren, Ohio reports he made his FCV-2 converter overload resistant. Is that the same as overload **proof,** OM? If so, lots of us would like to hear how you did it!

WA8DZP, Detroit, Michigan reports working W8TWK/9 in Illinois at 2210 EST on February 3.

W9JFP, Milwaukee, reports working K8ZES in Gallion, Ohio on January 5 dur-

ing the contest. Amazing what an extra bit of activity will do for dead band conditions, isn't it Vic!

WØWYX, 11,500 feet above sea level on Squaw Mountain near Idaho Springs, Colorado reports he has trouble keeping any decent sized arrays in the air. Wouldn't think you would need but a piece of wet string from that QTH OM. He has a four element circular quad on two meters with 100 watts of RF. Should be a good candidate for some real DX.

WAØASA, Wichita, Kansas has completed a 4X250B final and reports working W5PZ in Ponca City during the VHF SS.

WAØDZH, Marion, Iowa reports two meter activity low but he is hoping for some Aurora soon.

KØJQV, Wichita, Kansas reports working a slug of 5 area stations during the VHF SS including VHF's W5HCX and VHF author W5ORH (The Little Feller, November 1962 issue). Both W5HCX and W5ORH were on SSB.

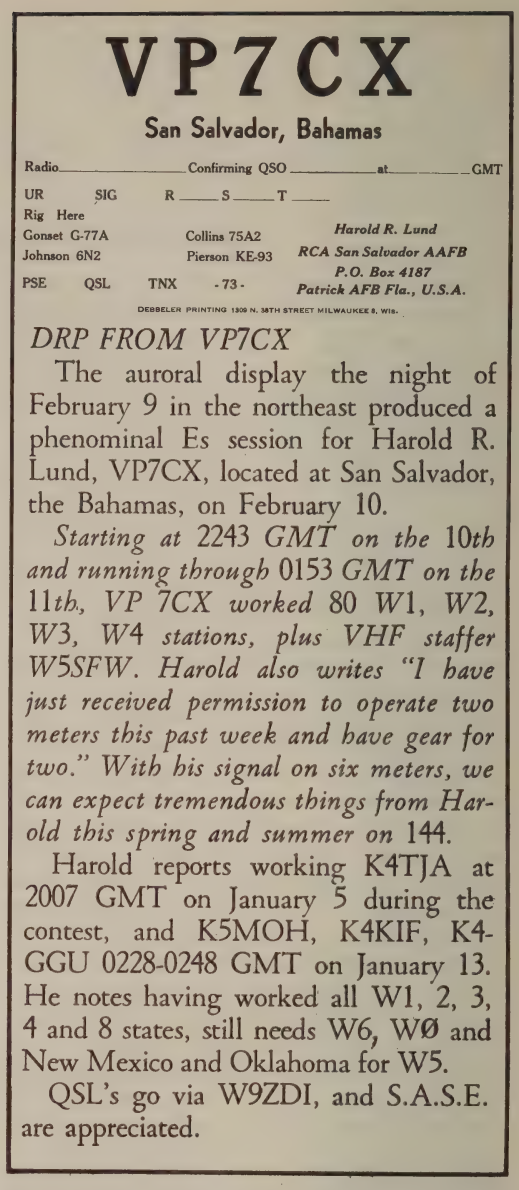
WØLFE, Bowling Green, Missouri reports adding a P and H 2-150 transmitting converter and a Parks two meter converter during January, and notes ". . . like 'em both." Lots of the two meter gang are adding these items to their shacks; VHF recommends both very highly. Ed also reports coming close to a contact with K7-HKD on meteors during January, as well as near misses with WØEYE and WØIUF, both Colorado.

50 Mc News continues to roll ahead. There were few signs of DX on six during January except for a brief session as the month closed, although February got off to a good E-skip start.

Bob, K8IFL, reports on the address of the newest DX enthusiast outside the USA on six. VP7CX can be reached at (direct) Harold R. Lund, RCA, Pan American World Airways, Inc., San Salvador, P.O. Box 4187, Patrick Air Force Base, Florida. Wow—some address! No wonder he's letting a W9 handle his QSL chores! At last word VP7CX had worked 30 states and all call-areas except W6 and Ø. He's worked more than 500 stations to date from the Bahamas and has worked as far west as K7ALE in Tucson. He is using a 6N2 and a 6N2 converter ala Johnson, with a Finco 6N2 beam. He has also worked KP4 and a YV3 station. QSL's go via W9ZDI, who is also handling his 15 meter QSL's. He can be found on 15 most days, and plans to be on two meters this spring. He also intends to be active on six and two through the summer period, so there is still hope if you haven't yet worked him. Oh yes, his home call is W8LIM and he's from Ironwood, Michigan.

K9DNW/7 is now slant in Libya, North Africa. Wrong part of the sun spot cycle for F2 so here's hoping he makes it back there in say four years.

WA2ADZ asks if we are kidding when we ask for DX reports on the DRP card. Nope OM, not kidding. Some of the gang worked DX as you will shortly see.



DRP FROM VP7CX

The auroral display the night of February 9 in the northeast produced a phenominal Es session for Harold R. Lund, VP7CX, located at San Salvador, the Bahamas, on February 10.

Starting at 2243 GMT on the 10th and running through 0153 GMT on the 11th, VP 7CX worked 80 W1, W2, W3, W4 stations, plus VHF staffer W5SFW. Harold also writes "I have just received permission to operate two meters this past week and have gear for two." With his signal on six meters, we can expect tremendous things from Harold this spring and summer on 144.

Harold reports working K4TJA at 2007 GMT on January 5 during the contest, and K5MOH, K4KIF, K4-GGU 0228-0248 GMT on January 13. He notes having worked all W1, 2, 3, 4 and 8 states, still needs W6, WØ and New Mexico and Oklahoma for W5.

QSL's go via W9ZDI, and S.A.S.E. are appreciated.

In Coming Months . . .

We'll be having the best VHF/UHF articles you've seen for a spell. For example, the following are among the features now scheduled for our May issue (off the presses April 20). Naturally, last-minute developments may make it necessary to replace one or two of these with even more timely material — but if so you can be sure they will be appearing in the coming months.

✔ **Little Joe**

Staff Historian A. David Middelton, W5CA/W7ZC, tells another incident from the days of W2OEN. This is a short but moving story of how one ham, not blessed with capital, managed to stay on the air. If you enjoyed "QSO SHOWBOAT," you'll not want to miss this item.

✔ **Coaxial Cavity Design**

Dr. Wally Lamb, W0PHD, has put together the first practical article we've ever seen on designing your own coaxial cavity to fit your own requirements. They work and they work well. Read how to do it.

✔ **50 Watts on Six — Simply**

Advanced VHF enthusiasts won't like this one at all — it's a simple, direct, efficient 50-watt 50-Mc rig built around a couple of 6CL6's and a 6146. The newcomers to our bands, though, will find it an excellent way to graduate from the transceiver class. K8YZP is the author.

This isn't the whole list by any means. The usual departments will be around, DX and operating news should be even more informative in May as the E-skip season gets into better swing, and we have a few items in the fire we don't want to talk about yet. Don't take a chance on missing this edition of VHF. Subscribe yesterday!

PLACE
STAMP
HERE

AIRMAIL TO: VHF Horizons DRP
P. O. Box 1557
Oklahoma City 1, Oklahoma

UNIVAC PROPAGATION REPORT FORM

Your Location (City and State) _____ Call _____

Geographic Coordinates (to nearest second) Longitude _____

Latitude _____ Bands covered ____6____2____220____432 Time in ____ST

Date/Time		Station		Location	Leave Blank	Sig Rpt	Type Fading	Antenna Heading
Start	End	Wked	Hrd					

Airmail completed report for period March 15-April 15 to

UNIVAC Propagation Project, Box 1557, Oklahoma City 1, Oklahoma

DRP REPORT FOR MARCH

From Amateur Radio Station _____ **QTH** _____

This month we built the following _____

_____. And, we improved the following gear _____

On the air DX highlights _____

_____

_____

_____

_____

_____

_____

Articles we enjoyed in April issue _____

WA2DEW/KV4CQ is planning another trip from Bloomfield, N.J. down to St. Thomas in the Virgin Islands. Now that sounds like a good DX-pedition. We'll all be watching for him to show up on six.

WB2CGY, Franklin Lakes, N.J. put a Knight T-150 on six meters recently and wants to know what we think of the Lafayette HE-45 B. It works OM.

K3KEL modified a Clegg 99'er for CW operation. How did you do it OM? He reports heavy wind and ice damaged his antenna system in Montoursville, Pa., so DX has been nil cause he didn't have the where-with-all to hear it !

W4CAH, Charlotte, N.C. reports adding a modulator to his 6N2. One more 100 watt AM signal on the low end this summer.

K5CFT, Sunray, Texas has finished building up the Heath HX-20 for 20 watts of six meter SSB. Now he joins Phil, W5-SFW in representing the panhandle on 50 SSB. Speaking of Phil, he passes along the May 11-12 Hamfest date in Amarillo. It would be worth going just to meet **Slew Foot Willie.**

W5KHT, Oklahoma City, found six open to W4 and 3 on 1/28, W6 on 1/29, W6 again on 1/30 and W6, 7 plus W5 backscatter on 2/1 when a log book page was filled with contacts. The band opened to W6 on the morning of February 10 and to W4 on the evening of the 10th. Who says February is no good for E skip!

W5BCS/5, Midwest City, Okla., found 50 Mc open to Nevada and K7ICW on February 16. At the same time, W5BIC in North Texas was working 6's in the L.A. area.

W6BUR, San Francisco, reports a nice rise in 50 Mc SSB activity in the San Francisco Bay Area. George writes "I've been on with my 10A since Ed Tilton's article back in 1957. For a long time it was only W6JKN and myself, then K6UZK, K6KFF and Red and I. Now the really active ones are K6QXY, K6YIL and K6HCP, who work scatter. I've counted 23 different Bay Area SSB stations now and they keep coming on."

WA6YOB in San Rafael reports working K7ONL, K7OWI, K7QXA, K7UKI/m, K7URG, WA5DHF, W4FLX (double hop Es into Florida), K5FGI, K5EBZ and WA6LGV (near the Mexican Border on short-short Es) from 2310 GMT on January 29th through 0205 GMT on the 30th for a nice winter time session.

WA6KHN, San Diego has built up a new 50 meg converter to seek out the rare DX stations this summer.

WA6SUL, San Fernando reports on the opening of January 29th noting Texas, Colorado and then Washington popped through at his QTH. The opening began at 1530 PST and ending up at 1730 PST. He reports seeing TV DX signals from the same three states as well as a Spanish speaking station on channel 3. He lives under the guns of the L.A. low band TV stations on 2, 4 and 5 so sticks to channel 3 for tipping him off to six meter band openings.

W7VHS, P.O. Box 84, Pinedale, Wyoming is looking for skeds on six meters. This should bring you a sack of mail OM!

W7CZG is a new op on six in Wyoming. He's running 3 watts but has an FB signal, according to W7VHS.

K7ICW reports the opening on Feb. 1, from 1900-2045 MST, from his Las Vegas location to Oklahoma, Arkansas, and N. Mex. Al noted that the New Mexico stations heard were working into Texas and Arizona, with W5TMQ working both ways at once! A possible 2-meter cloud missed?

W7HTW is set up for bear on six with a new 2E26 rig modulated with a pair of 6V6's in Class B. The entire rig is on a single chassis. A Nuvistor converter does the receiving. He's in Phoenix, Arizona.

K7JUE, Tempe, Arizona reports adding a Tapetone SB-50 unit and then working (on 50 SSB) K6HUM and K6HCP at 0152 GMT on January 30th. JUE had one of the outstanding SSB signals heard in W5 land February 1 during the Es opening. He says he's running a pair of 826's in the final. Must of had 10 KV on the plates from the sound of the signal!

W7CJN, Butte, Montana has added a 6DS4 grounded grid converter for six but reports no signs of DX signals to try the unit out. Just wait OM . . . almost here!

WA8ASQ, Taylor, Michigan has a B & W 5100-51SB rig running straight through on six meter SSB. Sounds like a good conversion OM . . . how about the details?

W8TZZ, Monroe, Michigan reports an Auroral-Es opening on January 12 when he snagged VE4TL and VE4FO from 0237 to 0255 EST. He notes "did not hear anyone else work them!" No wonder at 3 A.M. in the morning. Some guys never go to bed!

W8JND, Columbus, Ohio has a 6146 rig perking and has added a 6CB6 pre-amp

ahead of his HQ-170 receiver, reporting much improved HQ-170 reception.

K9POX, Chicago added a transistor preamp for six meter FM work, and reports it is working FB.

K9FKA goes back into December (1962 we assume) to report K5BTC worked from his Lincolnwood, Illinois QTH 1715 CST on the 27th.

K9DTB, Villa Park, Illinois took his 4X150 off six and is working on a 3-400Z to drive with his P and H 6-150. He reports a slug of 2, 3, 8 and 9 area stations worked on skip and tropo during December.

K7RIA/KØCER will be back active under his zero area call from Sioux Falls, S.D. soon. Bill will have his 5 element array and Ranger 2 working and desires skeds within range of Sioux Falls. He can be reached by writing in care of the KELO-TV studios there.

WAØBFF, Cedar Rapids, Iowa reports an auroral opening on January 29th (that's when the 5-6-7 area stations were working Es, OM) with W8, 9 and Ø area stations heard. No QSO's however. He recently completed a 6146 rig for six.

VE8BY, Pete, up in Yellowknife, NWT, tells us of an auroral-Es opening he sat in on January 31 0250-0410 GMT. Worked were VE4MA, VE6IP, VE6OH, VE4HW, VE4FO. Heard was WØEUQ. Oh yes, Pete has a new "local" station. VE8EW is now on 50 Mc. He's a little over 600 miles west of VE8BY.

220 Mc and up

Most reports center around 432 converter building. K1RTS, Waterbury, Connecticut reports acquiring an ARR-2 to put on 220.

WA2ONO is talking of being active on 220 Mc by QSO-party time.

K3LSB, Pottstown, Pennsylvania wants to see some simple superregen gear in VHF for 220 and 420. Who wants to write it?

K3KEL, Montoursville, Pa. has about completed a 432 Mc converter using a 6CW4 ground grid stage in RF. Why not the 8058 OM, and go all the way?

W4TLC, Taylors, S.C. has likewise about finished up a 432 converter. As has W4-CAH, Charlotte, N.C. His is a 6CW4 into 1N82A mixer, 12AT7 and 6AJ5 oscillator-multiplier.

W5BEP, Longview, Texas is searching for some 432 Mc SSB information. So is VHF. How about it some of you Bay Area, California geniuses?

Rex, W5RCI, has 500 watts on 432.045 now, loading into his 64 element array. Someone should hear you Rex.

WA6GYD, Palo Alto, finished up his 432 tripler and modulator-driver for this band.

W6IEY, La Mesa, finished his tripler for 432 and installed a 15 element yagi antenna. He also added 4 elements to his 220 array making 13 total. His 432 rig ends up in a surplus TDZ cavity. Tell us about it OM.

K7ICW and K6IBY made the grade on their 220 Mc effort from Las Vegas to Costa Mesa, Calif., the night of February 7. The skeds continue every Tuesday and Thursday night on 221.5 Mc from 1930 to 2000 PST. K7ICW transmits first 2½ minutes. Listeners are welcome.

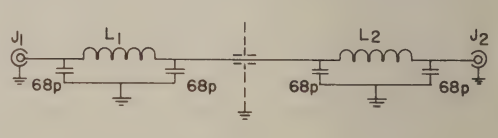
K7KDU, Seattle, Washington built up a 1296 cavity wavemeter and a 10 turn Helix antenna.

WA9FTN, Milwaukee, Wisconsin converted an APX-6 and wants to know where one can find a UPX-4 'cheap.' Most of us would be willing to pay good money just to get one OM!

Vic, W9JFP, also Milwaukee, reports he is silverplating his 54 element yagi on 432 (you're a lovable nut, Vic) and hopes to have it in operation 130 feet in the air by the time this is in print. (Hint to WA9-FTN: Some cloudy night, steal over to Vic's and scrape the silver plating from his 432 yagi. Collect it carefully and turn it in for cash. Use the cash to buy the UPX-4.)

WAØDZH, Marion, Iowa wants to put his state on the air on 432. He's finished up his 432 converter, using a 416B into a 6CW4 GG stage. He is multiplying up from 144 with a 3CX100A5 to 432. He and Vic ought to get together on ¾ meters this summer with little trouble.

Silver plated elements . . . phewww!



J1, J2 – COAXIAL CONNECTORS

L1, L2 – 4 TURNS, 14 SOLID COPPER, 1/2" DIAM., 3/4" LONG

HOMEBREW TVI FILTER designed by K6RNQ for 50-Mc use. J1 and J2 are coaxial connectors; dotted line indicates internal shield. Filter must be fully shielded to be effective; SWR on 50-ohm line must also be low for filter to operate properly.

VHF-TVI

Part 9
by K6RNQ

Many VHF'ers are using surplus crystals of the 6, 8 or 9 Mc variety in their rigs (or a VFO operating on one of these frequencies), and in some cases even 12 Mc crystals are used. Harmonics of these crystal frequencies can, in many cases, be an unsuspected cause of TVI. This is particularly true in fringe or semi-fringe areas.

To aid you in quickly determining if one of these harmonics may be the cause of a particular case of TVI we have drawn up the following chart. It lists crystal frequencies, the order of harmonic and the TV channel in which the harmonic will fall.

BAND	XTAL FREQ.	HARMONIC	TV CHANNEL
50	8334-8571	7th	2
50	8572-9000	7th	3
50	8334-9000	8th	4
50	8444-9000	9th	5
50	6250-6666	9th	2
50	6667-6750	9th	3
50	12,500-13,200	5th	3
50	13,200-13,500	5th	4
50	12,666-13,500	6th	5
50	12,500-12,571	7th	6
144	8000-8222	7th	2
144	8000-8222	8th	3
144	6000-6166	9th	2
144	9000-9250	6th	2
144	9000-9250	7th	3
144	9000-9111	9th	5
144	12,000-12,332	5th	3
144	12,000-12,332	7th	6
220	8148-8133	7th	2
220	8148-8250	8th	3
220	8251-8333	8th	4
432	Will generally parallel 144 Mc as the same basic crystals are used.		

Any of these harmonic frequencies may be greatly attenuated by the simple expedient of installing a series-tuned trap, resonant at the frequency of the offending harmonic, in the plate circuit of the oscillator tube.

No harmonics higher than the 9th order were listed as higher order harmonics rarely cause trouble.

A point of interest to 50 Mc operators: A lot more channel No. 2 TVI is caused by the 7th harmonic of 8 Mc crystals than is generally realized. This is due to the fact that most 50 Mc tank circuits will pass some energy at 56 Mc.

TVI can also be caused by a frequency multiplier operating on a frequency in a TV channel.

LETTERS

Dear Bob:

"I wonder if you could tell me who makes HiPass filters and where I can buy one?"

Thanks,
R. S.
Ohio

High Pass filters are manufactured by: Drake, Bud, Ameco and Amphenol among others. They are readily obtainable from Allied Radio, 100 N. Western Ave., Chicago 80, Ill.

Dear Bob:

"Just one simple question. Why does TVI happen?" . . .

J. J.
New York

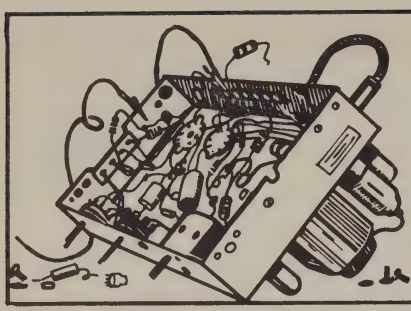
But what a question! Let's say TVI occurs due to: proximity effect between the transmitter and the TV set, poor design on the part of some TV sets, harmonics, poor design on the part of some transmitters, improper operation of a transmitter and just plain "bad luck."

Robert:

"A friend of mine uses vertical polarization and doesn't have any TVI. . . . Do you think it would help me get rid of my TVI if I went vertical?" . . .

Sincerely,
G. S.
Calif.

TV uses horizontal polarization, so if you cross polarize, i.e.: use vertical polarization, your field strength at a horizontally polarized TV antenna would be reduced by a factor of 20 db, or so. Naturally this may help eliminate a lot of your TVI.



THE CONSTRUCTION BOX

Crystal Etching Fluid

A solution for etching FT-243 crystals to move them off the crowded spots is available in the grocery stores locally. Called "Whink" and billed as a rust stain remover, it contains weak hydroflouric acid and will raise crystal frequencies. We have also seen one other rust stain remover under another name—look for the brown plastic bottle. Up to about 100 Kc at the fundamental frequency, for 8-Mc rocks, the results are very good; above that, unpredictable. Care should be observed in handling the solution, and of course, scrupulous cleanliness when handling the crystals and holders. Use tweezers as much as possible and wash crystals thoroughly after etching.

—W4VRV

Matching Coax to Collinear

This is how I matched 50-ohm RG-8/U to a 16-element co-linear beam. First I tried a coax balun but the SWR was high. Then I tried a ¼-wave piece of 300-ohm line, still high SWR. Then it struck me why not parallel two pieces of 300-ohm line and vary the spacing to get a good match. I found out that about ¼ inch spacing worked real well. Changing the spacing makes a big change in SWR, so I used Lucite blocks for spacers tied with plastic tape. One end of this assembly was connected to the phasing line and the other to a coax balun.

—W6DEE

Logging Made Easy

Now you can keep 50, 144, 220, 432, etc. logging in separate files or file by call letter for quick reference with this original unique method utilizing a Dorson Jr. time stamp and custom card system. The card illustrated is self explanatory in that you check off most operating constants, enter power and call of station worked plus other data desired. No need to look at the clock after setting the date time stamp before operating. Just stamp time in and out on back of card. This really helps in fast pace SSB, too.

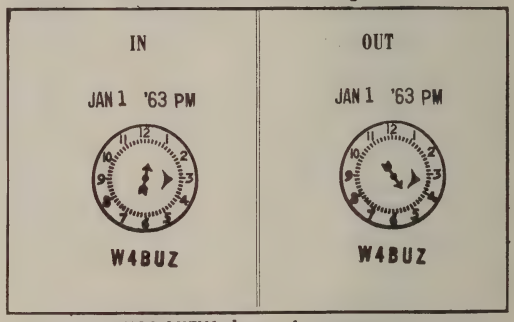
Log of Amateur Radio Station W4BUZ
2606 Immanuel Rd. Greensboro, N. C.

Station Called K4GPL — Power Input 1 KW

Freq. Band	Emmission
☐ 3.5 mc	☐ A0
☐ 7.0 mc	☐ A1
☐ 14.0 mc	☐ A2
☐ 21.0 mc	☒ A3
☐ 28.0 mc	☐ A3a
☒ 144 mc	☐ A5
☐ Other ____	

OTHER DATA
Handle RON
QTH G-boro, N.C.
RST 5-9 QSL SENT
Bill Smith
Operator - Guest ✓
Time data on other side.

FRONT VIEW of W4BUZ log card.



REAR VIEW shows time stamp.

For full rule compliance, the first card in the file must be prepared special giving name, address, town, and state with the statement that unless otherwise specified, all transmissions are by you, the licensee, and that time data is in EST or what have you. Then sign the card. If you test or call CQ, draw one line through station and enter CQ or TEST after called, etc. If a friend ham operates your station, he must sign his name and period of control of apparatus. If a friend speaks over the mike, or a phone patch is run, the name of the person speaking over your station must be entered. My cards are 3x5" and in pads of 100. It's worth the cost!

The time date stamp can be ordered from any office supply house.

—W4BUZ

Improving Twoer Selectivity

A substantial improvement in the selectivity of the Heath "Twoer" may be obtained by changing resistor R10 from 10 megohms to anything over 27 megohms. This modification takes but a few moments to perform and does not cause any loss in sensitivity.

—WA6OUJ

No Cost Oscillator

A major stumbling block to anyone interested in a cheap homebrew SSB mixer is the injection oscillator. In many cases, the receiving converter has a low drive level, highly stable crystal oscillator, on the proper frequency, just begging to be robbed of a little signal. At K5EVI, a one-turn link was wound around the oscillator coil, and presto—**6 Meter SSB!** In some cases, it may be necessary to throw in a buffer stage, to up the signal level for the SSB mixer. No problems with birdies have been experienced and the converter's sensitivity has not been in the least impaired.

—K5EVI

Power Supply Test Load

Often the need arises to check the characteristics of a power supply under load. Most of us do not have access to several handsful of power resistors. A simple solution (no pun intended) is to use a saltwater solution as the load. Use a plastic container or earthenware crock. The power to be dissipated will determine the size, but a 10 to 12 inch diameter works nicely for power up to 1 KW. Fill the container with tap water and immerse the tips of fine wires from the power source on opposite sides of the container. Apply power and take voltage and current readings (BE CAREFUL—avoid contact with the water load and be sure your hands are dry!). If current is too high the tap water must be replaced with distilled water; if not enough current flows turn off power, add some salt, stir, and try again. I have used this technique successfully to check supplies up to 5 KV at 1 amp.

—K6YWE

Do-It-Yourself 4X150 Sockets

by Frank Griffin, WB6AOW
Box 633
Port Hueneme, California

Want to put those 4X150's to work for you but don't want to spend those hard earned dollars for a socket? Well read on.

As many of you have noticed, the basic socket is the old eight-pin "loctal," so here's your start. However, choose a ceramic "loctal" socket, forget that mud base stuff.

Next is the screen connection; here is where some work is involved, but it is more than rewarding for the time spent. Actually, this connection forms the RF screen-bypass capacitor as well as making contact to the 4X150 screen.

You'll need some thin brass or copper (like shim stock), teflon or mica insulating material, some finger stock, and four 6/32 x 3/8 bolts and nuts. The finger stock can be purchased or you can do as I did, bust it loose from an old RF cover from a discarded surplus transmitter by punching out the rivets.

The shim stock is cut into two pieces 2 inches square and a hole cut in each piece for the tube to pass through. The holes should be 1½ inches in diameter. Next, cut two pieces of mica or teflon into 2 inch squares and cut one center hole 1-9/16 inches in diameter and one center hole 1-1/8 inches in diameter. This can be done with sharp scissors or your drafting compass. The pen compass works best as a double edge razor blade can be broken off to a sharp tapering edge, tightened up in the pen and secured with scotch tape. (This will also be useful for other holes in non-metal material.)

Now take one of the metal pieces and lay out four corner holes, each ¼ of an inch in from the flat side of the "square" (see diagram). After laying out the holes, stack all the pieces like playing cards and center punch the stack. This assures that all corner holes will be in line.

Take the "finger" stock, cut off eight of the "fingers" and tin, with solder, the bottom side of each. Lay out the other metal square with eight "spokes" for the "fingers." Tin these areas also.

Now the fun starts. Measure the spring distance of the fingers and set two on the tinned square 180 degrees apart so that they will make solid contact with the screen of the 4X150. Without too much jarring put your iron on the "fingers" and sweat them into position. Check for solid contact, alignment and solid soldering and then put the remainder of the "fingers" on. Your socket is now ready to assemble.

Take the square without the fingers and use it to drill and punch the chassis where you want the 4X150. Be sure all burrs and metal surplus are removed from the chassis as these burrs can puncture your insulator and short out the capacitor!

Mount the "loctal" socket with flathead screws as the chassis should be flat to accept the first insulator.

From the bottom of the chassis inside insert two of the 6/32 screws in opposite corners and start stacking the squares in this order:

1. one insulator
2. finger contact section
3. other insulator
4. other metal square

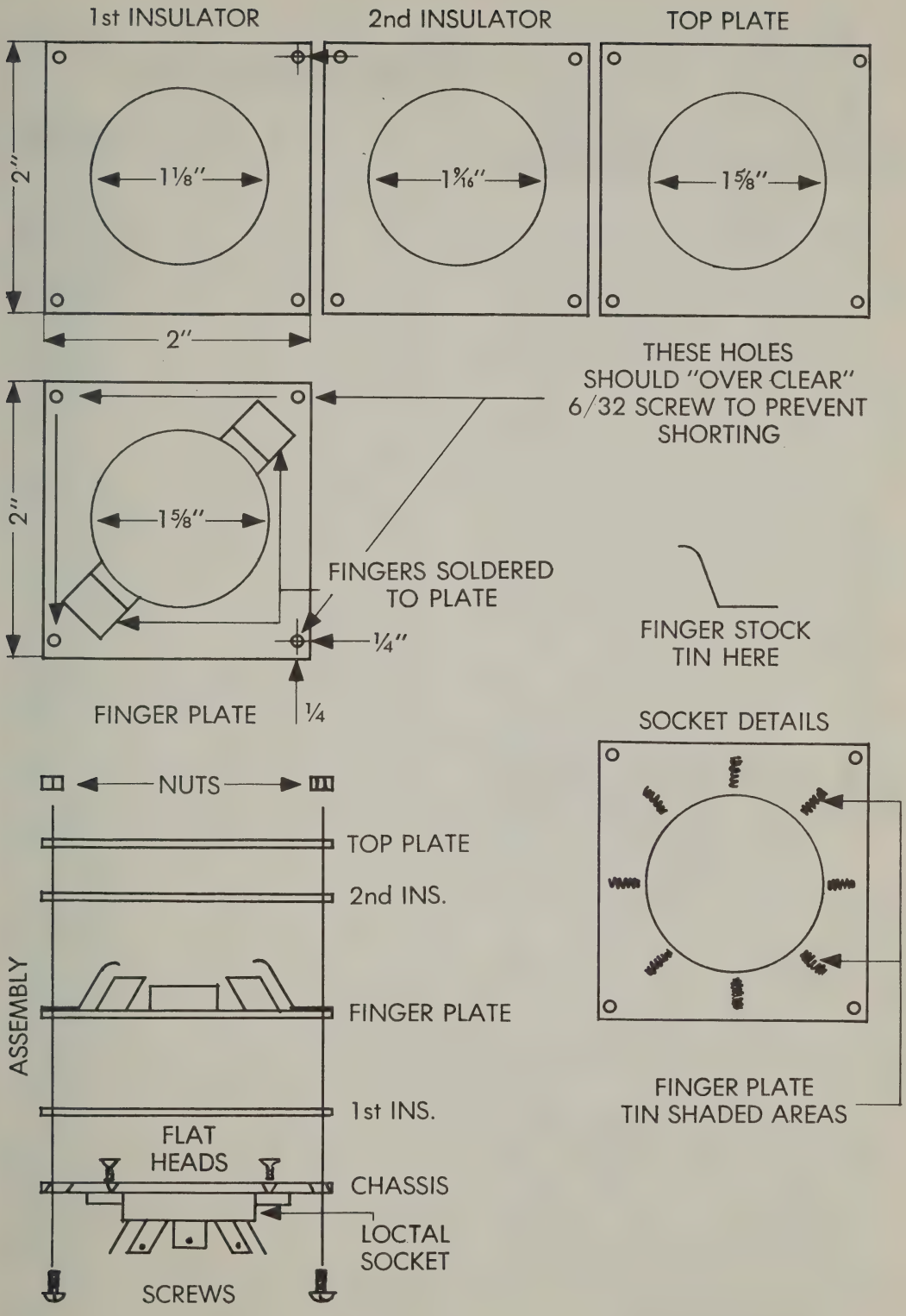
Drop on the nuts and slightly tighten. Then put the other screws in and after aligning all the sections, tighten up.

At this point, as if I had to tell you, put in the 4X150 and see what a fine job you have done!

For the plate connector, use some of your shim stock to make a band to go around the head-fins ring of the tube. Leave about ½ of an inch extra so after the ring diameter has been determined the stock can be bent outward and secured with a nut and bolt. The addition of a solder lug here makes a good connector and the plate "lead" can be soldered right in.

So, that's your socket; it works for me and it will work for you. Use a little care, be sure to remove all of those burrs, and you can use all those 4X150's you have.

Just one parting thought—have you ever looked at the 4X150 specs as a modulator? I have, and these little block busters may be my next modulator project.



COMPONENT DETAILS show particulars of bypass construction for do-it-yourself 4X150 sockets. See text for details.

Scanning the literature

CURRENT MAGAZINES

Pulse: A Practical Technique for Amateur Microwave Work. Robert F. Guba, W1QMN, and John T. Zimmer, W2BVU. QST, February, 1963, page 23.

February is a hard month to pick the top-interest VHF/UHF article from the literature; this 4½-page essay—the first installment of a series—won out primarily because it offers some practical, you-can-do-it-too approaches to a way of utilizing that microwave space languishing above 1300 Mc!

This first installment shows a block-diagram description of the equipment now in use by the two authors, and offers enough data to fire the imagination of almost anyone interested in the UHF-and-above region.

For instance, would you like to have your own radar, capable of spotting objects up to 30 miles away? The system described in this article can be used as one—in fact, that's the simplest way to tune it up!

Actual construction data is promised for the remainder of the series. We hope it won't require too much in the way of machine tools to duplicate the equipment—and we're looking forward to reading it.

Recommendation—need we make one? Read it, by all means!

IN THE SAME QST:

An Interlaced Quad Array for 50 and 144 Mc, K8WYU. How to build and feed a 2-band cubical quad at VHF. Detailed data for duplicating the unit; mechanically it appears to be a good one too (the first K5JKX quad blew apart in a light breeze!). Excellent article. 3 pages.

Double - Conversion V.H.F. Converter with a Single Oscillator, W1EYM. How to have both low images and a low tunable IF. The idea isn't completely new, but it's a good one. 1½ pages.

The Oscar III V.H.F. Translator Satellite, W6SAI. Description of philosophy and development problems connected with the next Oscar. Must reading if you intend to try to work Oscar III. 2-2/3 pages.

IN THE FEBRUARY 73:

6M SSB, W2NSD. General discussion of pros and cons of 50-Mc SSB, with history of the band thrown in. Roundup of commercial SSB gear included too. 3 pages.

432 Mc Gallon, K2TKN. Complete how-to-do-it on building a 432 KW around an RCA 7650 (if you can get hold of a 7650). Excellent material; wish we had had it instead. 4¼ pages.

Mountain-Topping for Blood, K1CLL. How to work 200-mile DX on 2 meters with the aid of a good mountain. But what if you live on the prairies? 3 pages.

Ultra-Stable Xtal Oscillator, K2TKN. Schematic of primary frequency control for 1296 Mc moonbounce project. ½ page.

Station Time Panel, Ives. Not exactly VHF, but this device gives your station clock 1/20 second accuracy at all times with an automatic WWV-synchronizing circuit.

A Precision Frequency Standard, W4-WKM. How to use components of the AN/SRT-14 to build a frequency standard giving you top accuracy at 10-Kc intervals. 4 pages.

IN THE FEBRUARY CQ:

The Overtone-Harmonic Crystal Oscillator, W6AJF. A new oscillator circuit from Frank Jones, which can give output on 130 Mc in one stage using inexpensive crystals. Also has data on a 2-meter converter using the circuit. 4¼ pages.

A "G-Line" for U.H.F., W6HPH. Report of experiments with surface-conduction line. Losses were high at 432 but on 1296 measured loss in a 150-foot run was just 1 db. Who needs waveguide? Most interesting. 2 pages.

V.H.F. Transistor Bargains, W6TNS. Listing of V.H.F. transistors available for $4.95 or less. 1¼ pages.

The Amazing Skeleton Slot, K2ZSQ. General description of this unusual antenna. 1 page.

Twelve Hour VHF Contest. Announcement of a contest. It's already over as you read this. 2 pages.

The Care and Feeding of TV Rotators, W3JJY. What's in a TV rotor and how it works. 1 page.

New Linear, WB2AAI. Product report on e.c.i.'s 6-meter linear (6146 final). 1 page.

Getting Along with the Indians, K3HNP. How to cure TVI. 2 pages.

Letters

Dear VHF:

Congratulations on your editorial in the February issue! It is really a mature approach to a subject that many treat with ill-considered emotions.

The RM-389 proposal is interesting but extreme. If all present technician class privileges were retained but new licenses and renewal licenses issued only by FCC-administered examinations, the class of license would become respected. Perhaps, though, the theory should be that of the Extra Class instead of that of the General Class, as most holders of Technician class licenses believe themselves to be the only technical-minded personnel of amateur radio!

73,
Carl Drumeller, W5EHC

Carl—

We might go along with your thought if, at the same time, all General, Advanced, and Extra Class licensees were required to pass re-examination on the code-speed requirements at every renewal. But thanks anyway for the compliment. We appreciate it.

Dear VHF:

Retain your excellent format of VHF articles and I'll remain a fan of yours. How about some articles about VHF FM? I'm working in 2-meter FM (mobile and fixed) and I'd like some info.

Best of luck and 73,
Alan Christian, WA6YOB

Alan—

We'd love to run such articles if someone would send us some. How about it, authors?

A Brief History of Ham Radio Since 1945

by Jim Kyle, K5JKX
Managing Editor, VHF Horizons

For nearly 12 years, the structure of the ham radio licensing system has undergone almost no change; many of today's licensees (who weren't around 12 years ago) are not aware that things were ever different than they are today!

The present system is a far cry, though, from "the old days" of hamming. This drastic difference is probably part of the reason for the current situation and so-called "discrimination" among hams who hold different classes of license.

Arguing no point, attempting to prove nothing, let's go back and look at the history behind us all as hams. Possibly if we all know a little more about what has gone before, we can better handle the inevitable problems coming tomorrow.

For an arbitrary starting point, let's take December, 1941. In these days immediately prior to World War Two, ham radio in the U.S. was divided into three license classes; all of which were allowed at least some type of operation on all amateur bands.

Most privileged class was that known as "Class A." A Class A licensee enjoyed all amateur privileges; these included the use of phone on 75 and 20 meters, CW on 80, 40, and 20, and either phone or CW on 160, 10, 5, 2½, and on the higher bands.

In order to obtain a Class A license, one had to serve an apprenticeship in the Class B or Class C ranks. Before taking the exam for Class A, a ham was required to hold a B or C ticket for 12 months, and he had to show proof of using this ticket (such as a logbook).

Class B and C licensees were more restricted in their operation: CW on any ham band, but phone activities restricted to 160 and the bands above 28 Mc.

Code-speed requirements were the same for all three classes—10 words a minute.

The only difference between the Class B and the Class C licenses lay in the examination techniques; Class B was taken in person, from an F.C.C. examiner, while Class C was given by a volunteer.

To be eligible for a Class C license, one had to live more than 125 miles from a quarterly examination point; in the event a ham had a Class C and moved into a Class B area, he was required to appear at the next examination to take the Class B test!

That was the situation in the first week of December, 1941. Then, immediately following Pearl Harbor, the F.C.C. issued a series of orders which effectively put ham radio out of business for the duration. Operator licenses were still granted, but no new station licenses were authorized.

The war came to an end in August, 1945. On November 15 of that year seven bands were returned to the hams: 10, 5 (56-60 Mc), 2 (the new 144-148 Mc region, replacing 112-116 Mc), and four microwave bands above 2 kMc.

As a point of interest, one of the first postwar QSO's took place at 7:46 p.m. on that same day, between W2LGF/2 and W6BMS/2, on the 5300-Mc band! They operated duplex, using 2K43 klystrons at each end with 30-inch reflectors, and covered a 5-mile range. One was on 5280 Mc, the other on 5390.

In January, 1946, on the 16th, another FCC order released the 420-430 and 1215-1295 Mc bands for ham use, and six weeks later on March 1 the five-meter band from 56 to 60 Mc was killed and the new 6-meter band from 50 to 54 was substituted for it.

Though the exact limits of the bands above 50 Mc have undergone a little editing since (the 220-Mc band was, at first, from 235 to 240 Mc, for instance) the basic pattern of our UHF bands was essentially complete as of March 1, 1946.

But not so the license structure and status of the users of these (and the lower) bands. The old Class A-Class B-Class C license system, set up in the early '30s, had survived the war, but a number of suggestions for change were bandied about for several years.

On April 21, 1949, the FCC dropped a "bombshell" into ham ranks by releasing docket 9295, a notice of proposed rule-making.

This notice included, among other items, provision for abolishment (over a 3-year period) of the Class A license and the substitution instead of a higher grade (Extra Class), requiring 20 WPM code speed and a 2-year apprenticeship instead of only one. This was not new—an "Amateur Extra First" ticket existed as far back as 1929—but the toughness of the examination had caused it to be withdrawn.

It also introduced the concept of a beginner's, or Novice, license with extra-simple examinations in both code and theory, and the experimenter's or Technician's license restricted to UHF activity.

Since the new Extra Class, Novice, and Technician classes proposed in docket 9295 bore descriptive titles, the Commission also believed it should discard the old letter designations for the other three classes; so Class A became the Advanced Class, Class B was called General, and Class C became Conditional.

The FCC proposal aroused a storm of comment. For a time it appeared that the ARRL might be split by internal pressures, and two rival organizations appeared on the scene only to collapse almost immediately.

Most bitterly opposed of the F.C.C. ideas was the abolition of the Class A license. Many hams appeared to feel that the Class A license was satisfactory as a top-grade ticket, and wanted it continued. They did **not** want it up-graded into a tougher examination.

On November 16, 1949, some seven months after the original proposal, the F.C.C. issued an **amended** version for comment. Major changes were to allow Class A licenses to be renewed indefinitely, although no more new ones would be issued, and to change the frequencies assigned to the Novices.

(Original FCC planning had been for Novices to get 50 kc on 80 CW, another 50 kc on 20 CW, 500 kc on 10 CW, and 2 megacycles on two-meter phone or CW.)

The amended version retained the 50-kc assignment on 80 and the two-meter assignment, but quietly dropped the idea of any Novice operation on 20 and moved the Novice 10-meter assignment over to the newly-opened 11-meter band, from 26.96 to 27.23 Mc.

Over numerous ham objections to the still-remaining provision to discontinue new Class A grants and require Extra Class instead—one of the hams objecting was an FCC commissioner who issued a dissenting statement—the Commission on January 31, 1951, issued the order placing the amended proposal in effect as of March 1 of that year.

Novice and Technician class licenses were to become available on July 1. Class A licenses were to be discontinued (so far as issuance of new ones was concerned) on December 31, 1952.

At first, Technician and General class requirements were almost identical. Both were taken before FCC examiners, and both required the same **theory** test. The only difference was in the code speed. At a considerably later date, the Technician license was switched over to the by-mail-only category in an effort to reduce administrative load for the Commission.

The next major development came on May 1, 1952, when the 15-Meter band was established. At first, this band was a CW-only band (like 40 meters at the time) and as such, open to Extra Class, Advanced, General, and Conditional licensees alike.

But a bare six months later, on December 23, 1952, the FCC issued a pair of semi-surprise orders which shook ham radio to its core—and the shock is still echoing.

Although both orders were issued the same day, one took effect two days before the other: the concluding action of docket no. 10173, which removed all operating restrictions from General and Conditional class licensees, effective February 18, 1953.

This allowed **any** ham operator **except** a Novice or a Technician to operate anywhere in the ham bands; at a single stroke, **all "privilege" incentive to advance beyond the level set by the old Class B license (originally the apprentice class!) was removed.** To this day it has not been restored.

The other order was the closing action of docket no. 10073, and established a **phone** subband on 40 meters. Like those on 75 and 20, it was open to everyone except Novices and Technicians. Novices got a break too; a 40-meter subband was set aside from 7175 to 7200 kc for their use.

Just over a month later, on March 28, 1953, the 15-meter band was subdivided for phone and Novice segments also. This gain in privileges cost the Novices their 11-meter segment.

That FCC action marked the last major change in the structure of ham radio regulations, although a number of minor changes have occurred since. The 40-meter Novice

segment was expanded from 25 to 50 kc; Technicians (originally restricted to the region above 220 Mc) came to six and later to part of two; the 20-meter phone subband was expanded 50 kc upward to reach to the top of the band; 11 meters was taken away in 1958 and transferred to the Citizens Radio Service; and not long afterward CW segments were established on 50 and 144 Mc. The UHF bands have undergone considerable shuffling—particularly the one around 3500 Mc. Power limits were removed on 420. But the basic structure has not been changed.

At the outset of this article, we promised to argue no point and attempt to prove nothing.

In concluding, having kept our promise, we feel compelled to bring to your attention the editorial appearing on page 9 of the February, 1963, issue of QST.

If you've already read it, go back and read it again—referring all the while to this brief history of ham radio since 1945. If you haven't yet read the QST item, by all means do so.

And then, form an opinion—for yourself!

Scatter. . .from page 5

"I believe in the United States of America as a government of the people, by the people, for the people, whose just powers are derived from the consent of the governed; a democracy in a Republic; a sovereign nation of many sovereign states; a perfect union, one and inseparable, established upon those principles of Freedom, Equality, Justice and Humanity for which American patriots sacrificed their lives and fortunes.

"I therefore believe it is my duty to my country to love it, support its Constitution, to obey its laws, to respect its flag, and to defend it against all enemies."

Change just a few words in "The American's Creed" above, and it would possibly read: "The Amateur's Creed":

"I believe in the brotherhood of amateur radio, as an organization of hams, for the hams, whose enjoyment is derived from participation in any and all activities pertaining to amateur radio.

"Let it be that this brotherhood be a perfect union, one and inseparable, established upon those principles of freedom, equality, justice, and humanity for which amateurs have given unselfishly of their time and energies."

I therefore believe . . .

Is not the foregoing 'creed,' in its basic form, really the standard which we as Americans, and we as hams, should strive to equal?

I am not throwing stones at either the Generals or the Technicians in writing this. I am merely asking for more cooperation from both. Let's get our heads together, Technicians and Generals, and completely erase this rift by concentrating on amateur radio. From this point on, I prefer to hear not another word about this, a condition that shouldn't even exist.

Congratulations to you, VHF Horizons, for expounding some good old fashioned Americanism!

I am certain that all who read between your covers applaud this fact, as well as your excellent efforts to further amateur radio on 50 megacycles and up.

Richard G. Knowles
W8JND

What do you think?

—K5JKX

Letters

Dear VHF:

Saw your December issue and liked it. Here's my subscription. One comment: How about some information about other places than W5-land?

I enjoyed the 2-meter linear the best of any article I saw. "Twoer" conversion was very good also.

73
K1YLU

OM—

We're getting around; last month we had D.R.P. reports from every call area. Maybe next month we will make a "WAS" via the D.R.P. cards—and this is one of the biggest sources of news. Send yours in today!

Dear VHF:

I like your magazine. Keep up the good work! Continue with more construction articles and features. Keep away from the gossip-column type of magazine. Also try not to feature the same people in your operating and DX news column such as W5KHT. Let someone else share the limelight.

Conspicuous by its absence is the lack of news, articles, and research consultants from the northeast.

I have a 416B preamp in the works for 144 Mc and 420 Mc. In the process I acquired quite a few 416B's and if anyone is interested in them they may be had for $2 or $3. I limit the number per person to 4; I assure you I am making no profit.

Will also consider swaps such as HV xfmr, 700-watt mod xfmr, 7½-volt 30-amp xfmr, etc.

I would like to find others in a 50-mile radius interested in makng a group effort wth moonbounce.

73,
Ron McCloud
P.O. Box 149
Hinsdale, Mass.

Ron—

Thanks for the comments. We're wide open for contributions from 1-land—as well as from anywhere else. Also have room for a few well-qualified research consultants. How copy, W1OOP?

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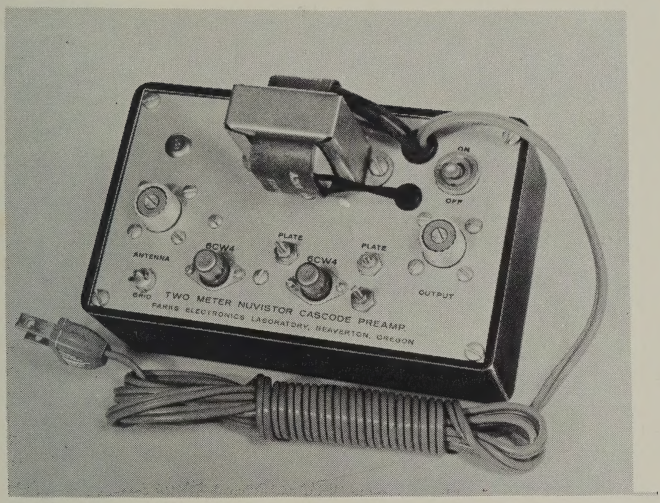

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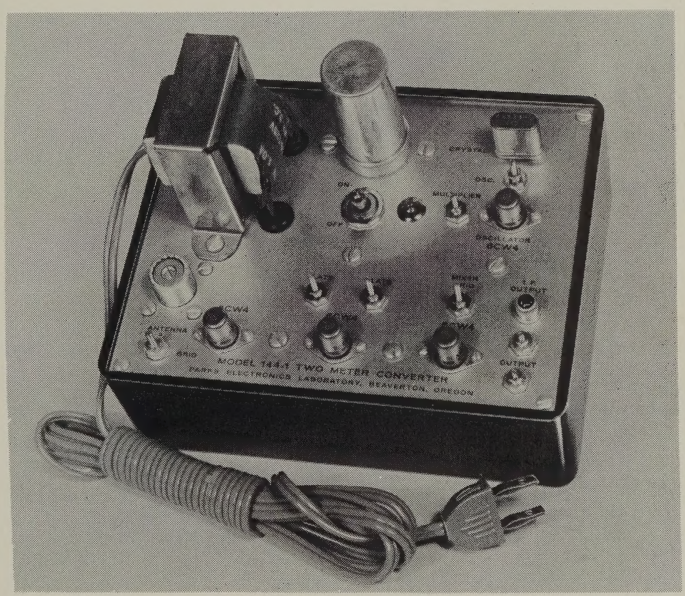

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23,890 readers* can't be wrong! Direct your inquiries to Publisher Bob Cooper, W5KHT, at P.O. Box 1557, Oklahoma City 1, Oklahoma, or phone CEntral 2-1108 for the story.

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